THE MARINE REVIEW

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NEW SHIP YARD ON THE MERSEY.

The new ship building yard which Messrs. Cammell, Laird & Co. are having built for them at Tanmere Bay, Birkenhead, Liverpool, will, it is claimed, be the finest and most up-to-date in the world. These new works are now approaching completion and as they adjoin the old ship yard of Cammell, Laird & Co., the whole concern now covers an area of 105 acres, 80 of which are devoted to what is familiarly known as the extension. In addition to the fine graving docks in the old portion of the works, there has been provided two new graving docks, one of which is 708 ft. long by 80 ft. broad, with a depth of water on the sill at ordinary spring tides of 31 ft.; and the other is 850 ft. long by 90 ft. broad, with a depth on the sill at ordinary spring tides of 34 ft. In addition there is a fitting out basin with a water area of 14½ acres, and about 3,000 ft. of quayage. The entrance is 91 ft. 6 in. broad and the depth on the sill at ordinary spring tides 34 ft. The larger of these dry docks will take a war vessel like the Dreadnought, or a vessel of the size of the Lusitania. The machinery equipment of docks and workshops is of the most modern description. On one fitting out quay there is a 150 ton crane, and on another a 40 ton crane. Close to the basin are the engineering and boiler making buildings covering an area of 217,000 square feet and possessing a crane service throughout, capable of loading up to 150 tons. Beyond these shops are the building slips, nine in number, and plating sheds. The slips are designed for vessels from 700 to 1,000 ft. long. The platers' sheds cover an area of 145,000 sq. ft. and their facilities for the rapid handling of the heaviest material are quite notable. The motive power throughout is electric, produced by gas engines driven by Mond producer gas and direct coupled to the electric generator. There is besides a complete installation of hydraulic and pneumatic power.

150-TON HAMMER HEAD DERRICKING CRANE AT CAMMELL, LAIRD & CO.'S NEW SHIP BUILDING YARD AT BIRKENHEAD, LIVERPOOL.
For description of this crane see MARINE REVIEW, July 4.

The new German Lloyd twin-screw steamship Kronprinzessin Cecilie is reported to have shown splendid results on her trial trip and proved satisfactory to the officials of the line. The trip developed a speed of 23½ knots without bringing into use the full engine power of 45,000 H. P. The vessel is a sister ship of the Kaiser Wilhelm II. of the same line and is 750 ft. in length, 72 ft. beam, 44 ft. 2 in. in depth and has a displacement of 26,000 tons. She is fitted with four quadruple expansion engines. The Kronprinzessin Cecilie will ply in the New York service.

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UNSOLVED PROBLEMS IN THE DESIGN AND PROPULSION OF SHIPS.

To Dr. Francis Elgar fell the honor of delivering the James Forrest lecture, which formed a fitting prelude to the Engineering Conference arranged by the Institution of Civil Engineers, which opened on June 19 in London. The subject of the lecture was "Unsolved Problems in the Design and Propulsion of Ships."

The class of problems that demanded attention first were, said Dr. Elgar, those which bore the most directly upon safety at sea. These were very general and comprehensive in character, and were impossible of anything like complete solution from the purely scientific side. But they were of vital importance, and solutions of them, which were, at any rate, upon the right side, had got to be found somehow for every ship that is built. The lecturer proceeded to review the attempts to deal with the load-line problem, remarking that the close attention paid during recent years to the protection of openings in the weather deck, in association with the strict limitation of loading now enforced by the Board of Trade freeboard tables, had resulted in an extraordinary diminution of losses at sea. The great reduction had been in steamers. However empirical and tentative the procedure may necessarily have been, the result was a very large and gratifying saving of life and property. As regards division of the hull into separate watertight compartments, even now full compliance with the Bulkhead Committee's rules was by no means general even in the highest class of steamers.

STABILITY AND STOWAGE.

Nothing could make a ship safe if her stability was not secured by proper stowage, but when vessels would obviously admit of being loaded with homogeneous cargoes, so as to have their stability dangerously reduced at sea, the official bodies who assigned loadlines should look for proof that the danger was understood, and that measures would be taken, in regulating the stowage, properly to guard against it. He understood that this was the course taken by the board of trade, and the authorities who assigned freeboards when cases of such a nature came before them.

STRUCTURAL STRENGTH.

There was no more intricate or difficult subject than structural strength, the usual calculations being unreliable in practice for the reason that they were generally based upon still water conditions. It was not known how nearly the results obtained by calculation upon assumptions that differed so widely from the real circumstances corresponded with the maximum stresses really brought to bear at sea, but it was certain that they were often in excess of the truth. In the new big Cunarders—Lusitania and Mauretania—the limiting stress accepted by Lloyds as determined by calculation was 10 tons per square inch, supposing the material to be mild steel whose ultimate tensile strength was 28 to 32 tons per square inch. This gave an apparent factor of safety of only three. Many vessels had been running for years in which the figures obtained by calculation for the maximum stresses would amount to 10 tons per square inch. That must be largely in excess of the truth, and it was impossible to say exactly by how much.

CHANGES IN DESIGN.

Sir W. White came to the conclusion which he (Dr. Elgar) believed was right, that after making full allowance for features of modern designs that involved additional weight, which the Great Eastern did not possess, her structure was lighter than that of the corresponding ship of today, although the latter was built of steel 50 per cent stronger than the iron plates of the Great Eastern, and the riveting of the edges and butts of plating was much more extensive and efficient, and was performed by hydraulic power where strength is most required. The difference in principle between the two designs was so great, and the comparison of the weights of material they required was so much in favor of the Great Eastern that there certainly seemed to be a case for inquiry, and for considering the question of a radical change in the structural design of large ocean liners. Some such change was being introduced into the design of cargo steamers in order to obtain large open holds and facilitate stowage. These were now being built of large size and depth, with only a single-plated deck at the top, and there seemed to be no reason why this principle should not be applied, to some extent at any rate, to large passenger vessels. Any saving of weight thus effected would not only be a saving of cost but would better enable the difficulties of draught of water in harbor and docks for the largest ships to be overcome.

TANK EXPERIMENTS.

In order to exhaust the problem of the best form of ship to meet the requirements of any particular trade or service, considerable investigation was required. It could only be made satisfactorily with models in an experimental tank upon the late Mr. Froude's system. Dimensions and draught of water were usually fixed beforehand by commercial considerations, and by harbor and dock facilities, at any rate within somewhat narrow limits, and the designer required to test models of varying degrees of fineness in order to determine the point at which the limit was reached beyond which the further increase of engine power and consumption necessitated by fuller lines would be unprofitable. This could be determined perfectly in an experimental tank. But that method was unfortunately impracticable for ship designers in general, because there was no tank in this country available for such purposes. The very few that existed belong either to the Admiralty or to private ship builders, and were confined exclusively to the work of their respective owners. He had had experiments made a few times for himself, but had to go abroad for the purpose. The tank experiments required by Mr. Yarrow for his valuable investigations into the effect of shallow water upon speed were made in the North German Lloyd tank at Bremerhaven, where other experiments had also been made for him. A British ship builder could only get such experiments made by setting up an experimental establishment for himself, or going abroad. An attempt had recently been made to provide an experimental tank at the National Physical Laboratory, to be worked by members of the staff there, at which ship models might be tested for resistance, but up to now it had been without result. The best practical solution of the long-vexed problem of speed appeared to be an extension of Mr. Froude's system to vessels of the fast liner type, and others with which the ship designer ordinarily had to deal, leaving those of abnormal proportions or form, and freaks, and also the work of general research, to a public experimental tank—if ever we found enterprise enough among those interested to set one up in this country.

PROPELLER EFFICIENCY.

Several endeavors had been made to construct a theory for the action of the screw propeller, but designers were bound to fall back upon the experimental method. The difficulty in connection with screw propellers had been greatest in the case of turbine vessels, where the shafts necessarily ran at much higher revolutions than

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with reciprocating engines. Dr. Elgar suggested as an effective means of acquiring additional knowledge the building of a special launch by which screws up to three feet in diameter could be experimented with, believing that a research on these lines would bring within reach of practical solution the important problem of propeller efficiency. At the present moment the greatest interest centered in the form which propelling machinery was likely to take in the immediate future. The progress of the steam turbine had been remarkable, but up to the present time comparatively few ocean steamers had been fitted with this type of machinery, the chief reason being the doubt which existed as to coal consumption. The Cunard company was making a crucial experiment upon the largest scale now possible. But the result was to some extent uncertain, and the immediate future of the turbine in fast liners depended greatly upon the issue. It was probable that the marine turbine would ultimately be so improved as to beat the best reciprocating engines in economy of consumption in ocean liners, but no proof was forthcoming that it could yet do it.

TURBINE PROBLEMS.

The problem was to secure a combination of turbine and propeller such as would give an efficient speed of turbine without reducing unduly the diameter of propeller, and experience with regard to this was much needed. The smaller propellers of turbine engines doubtless gained in efficiency on service by being immersed more deeply, and being thus less affected by the rising and falling of the sea at the stern. This was especially the case with some of the cross-Channel boats, in which the propellers had to be so large relatively to the shallow draught of vessels with reciprocating engines, even when these were run at the greatest possible number of revolutions per minute, that they were sensibly affected by the least disturbance of water-level. The difference in propeller efficiency soon became very marked as the weather got bad. In the Newhaven and Dieppe service, for instance, it was found that whereas the turbine boat Brighton only gained an average of three minutes upon the time of the reciprocating-engine boat Arundel in fine weather, she gained 15 minutes in anything like bad weather. The difference in favor of the turbine on account of extra immersion of propeller was not likely to be so great as that in ocean liners, because in them the immersion of propeller was not relatively so unfavorable with reciprocating engines, but it would doubtless be of appreciable value. There appeared to be some other cause, however, which operated unfavorably in bad weather at sea, especially when running against a strong head wind, to turbine vessels with comparatively small propellers. In such circumstances they fell off in speed more than reciprocating-engine boats with their large propellers would do; and, altogether, notwithstanding the greater depth of immersion, the efficiency of the propellers appeared to diminish more rapidly as they are reduced in diameter when driving the vessel against a head wind and sea.

NEW MAIL BOATS.

"It might be interesting," continued Dr. Elgar, "to give some particulars of two fast turbine steamers that are being built by the Fairfield company for the Egyptian Mail Steamship Co. to run between Marseilles and Alexandria. These vessels will go upon their station at the beginning of next winter season. They are 525 ft. in length, and their speed on service is to be 18½ knots. The turbines are to run at about 340 revolutions per minute, a rate which necessitates as small a diameter of propeller as prudence would allow. Everything that appears possible has been done to favor the efficiency of the turbine and reduce the weight of machinery. The boiler power is increased 6 per cent above what would be allowed for reciprocating machinery of equal power, but the gross weight of engines, boilers, and auxiliaries work out about 400 tons lighter for the turbines. The space occupied by the boilers and machinery is practically the same. A greater consumption of coal and a corresponding increase of bunker capacity has been allowed for, and it remains to be seen how the consumption will work out.

SPEED COMPARISONS.

"I am enabled, by the kindness of the general manager of the London, Brighton & South Coast Railway, to give some further particulars of the speed and consumption of their two boats, the Arundel and Brighton, the former fitted with ordinary reciprocating engines, and the other with turbines. These vessels are approximately similar in dimensions, displacement, and form. The figures given are the averages of more than a year's running, during which a total distance of about 20,000 miles was covered in each case. The average speed of the Arundel was 19.29 knots, with an average consumption of coal per trip of 16.16 tons. The corresponding figures for the Brighton are an average speed of 19.59 knots, with 17.18 tons of coal. If the figures for consumption be corrected so as to give the comparison at equal speeds, it will be seen that there is nothing to choose between the two boats in economy of fuel."

INTERNAL COMBUSTION ENGINE.

Nothing fresh had transpired with regard to the application of the internal combustion engine to marine work since Mr. Milton had laid down the conditions to be satisfied in this respect. Such an engine must be reversible, capable of being quickly stopped and started, of being promptly speeded to any desired number of revolutions, must be capable of running continuously for long distances, and of working under all conditions met with at sea. In addition, the engine must be economical in fuel at the ordinary working speed, must be compact, light in weight, and well balanced, must not involve the formation of an explosive mixture in the ship, and must be capable of using a fuel the supply of which at moderate price was unlimited and which could be obtained in any part of the world. Gas and oil machinery for large battleships at present existed only in imagination. Great practical advances had been made in the application of oil fuel for marine boilers, and a consumption as low as 9 lb. per I. H. P. per hour had been regularly realized in mercantile vessels.

COMFORT ON SHIPBOARD.

"The securing of all the comfort that is possible for passengers on board ship is a modern idea. Formerly it was thought sufficient to take them safely, and without much regard even to time, to their destination, and very little attention was paid to comfort. Now it is the chief object of the best shipping companies to leave and arrive in port on fixed days and even at fixed hours, and to make the life of passengers on board ship as comfortable and luxurious as on shore. The great pioneer in this cause of convenience and comfort to passengers was the late Mr. Thomas Ismay, the head of the White Star Line. He always held that the best ship for passengers was not necessarily the very fastest, but that comfort and regular arrivals in port were even more important. The traveling public seems to be coming to Mr. Ismay's way of thinking. It is not now so much the highest possible speed across the Atlantic that is in demand by pas-

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sengers. as convenience and comfort in traveling.

STEADINESS AT SEA.

"Much of the comfort and luxury now in such great demand by passengers is provided by those who manage the ships, and not by their designer. There is one very important element of comfort, however, which the designer can do much to supply, and to which increasing attention is being given. I refer to steadiness at sea, and freedom from heavy rolling and pitching." Dr. Elgar went on to point out that much had been achieved in this direction. Proposals had recently been made in connection with pendulum regulators and the Schlick gyroscopic apparatus, which was to be practically tested in the Hamburg-American Co.'s passenger boat Silvana, of about 1,000 tons, which runs down the Elbe to Heligoland. Dr. Schlick was designing a standard gyroscope which would be suitable for boats of 1,200 tons to 2,000 tons displacement. This standard gyroscope would be electrically driven, except in cases where there was not sufficient margin of electric power available in a ship, when it would be driven by a steam turbine. An apparatus for vessels of the displacement named would be applicable to the class of Channel steamers, and they might hope before long to see it tried in some of them.

SIZE AND SPEED.

"There is a size and speed of ship that is most appropriate and profitable for each line of steamers, or each trade, and it varies greatly in different trades. It is the managers of the various lines who know best what size and speed of ships are likely to be most profitable in their respective trades, and what are the maximum number of passengers, and quantities and descriptions of cargo likely to be forthcoming. The approximate size and the speed of mercantile steamers depend upon commercial and economic considerations which the ship designer usually has but an imperfect knowledge of. His part consists in producing a design that will fulfill the necessary conditions of size, draught of water, speed, carrying capacity, and accommodation for passengers in the most efficient manner and at the minimum of cost. There is one point, however, which is so important in considering further increases of speed that I would like to call attention to it.

ATLANTIC LINERS.

"Speed is limited in passenger liners, altogether independently of size, by economic considerations. High speed at sea is a costly luxury. It can be obtained by paying for it—up to 25 knots, as we see by the latest Cunard liners—but it has to be paid for by somebody. The extra cost cannot be got out of cargo freights, for as speed is increased the proportion of space available for carrying cargo is reduced by the increase of boilers and machinery, and therefore less cargo is carried relatively to the size of the ship. This reaches an extreme limit in the fastest Atlantic liners, because their holds are as full as they can be stowed of engines, boilers, and coals for the voyage, their speeds only being limited by the impossibility of getting more boilers in, and it is only a few odd spaces which cannot be utilized for any other purposes that are avilable for carrying a little cargo. In these cases cargo is reduced almost to a negligible quantity.

WHO PAYS FOR SPEED?

"As regards any line of steamers, it may be said that if speeds of more than 12 to 13 knots are desired the extra expenditure involved by such increase must be looked for outside the cargo. This element of earning power does not bear an increase of rate of freight. There are only two sources from which payment of the extra cost of increased speed could come. One is from passengers and the other from a mail subsidy. No mail subsidy that could be proposed would pay more than a small proportion of this extra cost; the greater part of it must be paid by passengers. What is paid by passengers for high speeds at sea may be seen by the rates charged in the fast Atlantic steamers. Apart altogether from the special cabins, or apartments de luxe, for which almost any prices are paid, the price of a single first-class passage to New York varies from £22 10s. to £48 10s. for a run of six days in one of the fastest liners, according to the position of the cabin in the ship and the time of year, or from 1¼d. to nearly 4d. per mile traveled. Prices have risen rapidly during recent years as the speeds have been increased, and passengers appear to be forthcoming in ever-increasing numbers who are ready to pay them. If that were not the case such high speeds could never have been reached. No great improvement of speed is to be looked for upon the other main lines of ocean traffic, unless some revolutionary change is made in the mode of propulsion which will cut down the cost, or a sufficient number of passengers are found who will pay the higher rates it would necessitate."

RACING OF MARINE ENGINES AT SEA INEXPENSIVELY PREVENTED.*

Ship owners and investors are respectfully invited to read and carefully consider the subjoined remarks and suggestions relative to the accomplishment of sea voyages with much greater safety, speed, precision, navigability, and otherwise more beneficially than heretofore, notably as regards the reduction of working expenses and the economizing of time, without any additional cost being incurred in first construction or in subsequent maintenance.

The useless "racing" of the screw propellers and engines of sea-going steam vessels is undoubtedly the most danger-producing, unprofitable, and detestable defect to which over-sea navigation is subjected. Under such depreciative influence the aggregate seaworthiness of all classes of steamers decreases very rapidly and ruinously, more especially of those in light trim. Such are soon rendered helpless and unmanageable by a moderate gale and sea; likewise with the fully-laden ones in encountering more tempestuous weather. Even those built for speed only, and expensively equipped, are greatly deficient in a rough sea. None escape the imperfections engendered by racing. All are liable to be driven helplessly ashore if near land in a heavy gale.

Satisfactory headway in proportion to power expended has never yet been attained at sea. The unproductiveness of steaming in a seaway as compared with the satisfactory results in smooth water is most ridiculous, when the propelling power expended and its cost is taken into consideration. For example, a distance of 200 knots and upwards, according to power expended, may be traversed in one day's run in smooth water, and on the following day probably no headway can be made in consequence of a contrary wind and heavy sea being encountered. The vessel may even be driven backwards or out of her course, although greater power has been expended by the engines and more coal used than on the previous day; also the risks of breakdowns and disaster have been increased to an unknown extent. Such enormous disparity in progressive efficiency and in liabilities incurred is not due to any incapacity

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of the propelling mechanism; it is because the screw has been alternately in and out of the water, acting in mid-air half the time, and the rudder likewise, both transmitting pressure only when immersed, and neither being in a position to do its intended work when most urgently required. No steam engine or other power can possibly obtain utility from or produce steerage way by the screw propeller when it is out of the water, hence safe, lucrative, and proficient navigation is utterly impossible in association with racing.

Besides the losses sustained in time and maintenance during protracted passages, the insufficient or inconstant immersion of the screw, and the consequent sudden and fluctuating strains thereby engendered, are responsible for lost propellers, broken shafts, disabled machinery, inability of vessels to leave or enter port in bad weather, and in many other ways involving loss of life, vessels, and freight, waste of time and money in towage, salvage, repairs and otherwise, proving conclusively that incongruity prevails and harmony is wanting between hull and propelling apparatus, and suggesting very forcibly that the requirements of screw propulsion among waves are not fulfilled in vessels as designed at present, moreover, that the propulsive effects of the screw are destroyed or lost owing to the natural propensity of vessels to lift their sterns clear of the water in a seaway. The behavior of the present vessels at sea indicates plainly that there is an excess of buoyancy on the after side of amidships, and a deficiency forward of that, hence their liability to bury their bows and raise their sterns, such being surely an imperfection in the formation of the hull, capable of being rectified simply and inexpensively. It follows that racing and its attendant dangers need not be tolerated any longer as a matter of course, or as an imperfection which cannot be avoided.

The screw propeller and rudder having been found to work most efficiently at the stern in smooth water, it is merely requisite to provide for their better immersion at that end in order to obtain their utility among waves. It is not necessary to mutilate the present design of the hull all fore and aft to admit of the screw being placed amidships, as has been proposed in telescopic tunnel arrangements, neither is it advisable nor workable to double the draught by placing the screw amidships and constructing an appendage for its protection under the present bottom, as has been recommended. All that need be done is to promote the principle of heaviness aft and lightness forward by substantially reducing the displacement or buoyancy of the immersed after-end—from the keel upwards to the top of the screw aperture—terminating that portion of the vessel's run further forward than at present, and transferring the screw and rudder as far forward of their present position as would be consistent with their working efficiently. The displacement or deadweight support thus lost at the after end could be regained by increasing the vessel's amidship breadth and filling out the form from amidships to the stem, thereby creating a natural tendency to droop at the stern and rise at the bow at all draughts of water, also preventing the present upheaval of the stern among waves, and ensuring its continual immersion to such a degree as would render racing impossible.

The transference of the screw and rudder forward of the present situation is of great advantage in securing their sufficient immersion to prevent racing and to obtain better propulsion. For instance, a 280-ft. steamer of ordinary design, pitching in a seaway, can lift her screw completely out of the water. Assuming that the screw were transferred 35 ft. forward, and the same upheaval taking place, it would be immersed about 4½ ft. in the water, instead of being out of it, as at present. Such increased minimum immersion—important as it undoubtedly is—does not represent the aggregate gain, as in the specified case. The hull alterations requisite to effect the transference would be the means of further depressing the after end, consequently, in a seaway, the minimum immersion of screw and rudder would be at least 75 per cent better than formerly.

The upper portion of the stern, from the top of the screw aperture upwards, could be continued right aft, somewhat as at present, and to compensate for its greater immersion in a seaway, also to provide additional cargo space, it is recommended that its extreme height be made equal to, or even greater, than the height of the vessel's bow. It is marvellous to note how little has been done by way of improving the hull design for the prevention of racing. The outward form of sailing ships and steamers is so nearly alike that their main difference lies in the means of propulsion. Considering the great disparity between wind and screw propulsion, it must be admitted that one model is most unlikely to suit the most efficient application of both. The steamer requires to be modified in a manner suitable for her means of propulsion. It has long been recognized that it is preferable for screw vessels to trim by the stern, both when light and laden, and it is now hoped that the advisability of providing for the wants of the screw will be speedily acknowledged by the adoption of the special design and arrangement herein indicated. There is another benefit of great importance that would accrue from the adoption of the herein-mentioned type of vessel. The heavy rolling in a side sea, now due to the great amount of water ballast in a steamer's bottom, would be very much reduced, as part of that ballast would be unnecessary, the permanent structure of the ship itself raising the center of gravity, and thereby reducing the rolling, making the ships more sea kindly, also improving the speed.

The most useful method hitherto adopted for the prevention of racing has been deep-end and shallow-bottom water ballast tanks, and thereby the discrepancy has been remedied to some extent. However, the limit of improvement in that respect has been reached, as deep water ballast tanks amidships have been tried and only proved a partial success, their use in light trim voyages inducing serious straining, and much expense is incurred in pumping the water in and out, also in keeping them clean for cargo; likewise with regard to deep side tanks, the latter occupying hold space which cannot be used for cargo. Governors have been used to limit the number of revolutions of the engines, and such have been highly recommended. However, it must be borne in mind that a thoroughly efficient one can only lessen the risk of damage to the machinery. It cannot possibly, even in the slightest degree, increase a vessel's speed or render the screw useful when it is not in the water, but fails to act at critical moments when speed and steering power is most wanted.

The screw propeller is certainly the most powerful and reliable, economical and useful means of propulsion so far introduced for sea-going purposes; likewise the modern marine steam engine is unsurpassed for supplying the requisite power economically and conveniently, any required degree of propelling power being thus available, and at the present time the full extent of its usefulness being only obtainable by fully-laden vessels in smooth water. It behooves all concerned to enhance the mercantile marine generally

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by taking immediate steps to prevent the present waste of expensive and efficient power in stormy weather by the adoption of the inexpensive and practical method herein suggested.

Although the proposed alterations are principally for the purpose of counteracting the defects exhibited by steamers in stormy weather, it may be as well to point out that the present good qualities in smooth water are not only preserved, but are improved upon; the screws and rudder being situated in a less exposed position than at present, could therefore be made more use of to govern the movements of vessels when in port without risk at sea of entanglement with derelict fishing nets, damage from floating wreckage, ice, and other obstructions. The shafting being shortened by the transference of the screw to about one-half its usual length, would cost substantially less than now, be considerably less liable to fracture from fluctuating strains or any other cause; likewise the friction would be reduced which would give an increase of effective I. H. P. to the engines without additional consumption in fuel, if working under the same conditions. I beg to state that, in publishing this, my first consideration has been to increase the safety of life and property at sea. Further, at no other period has British shipping had so serious a competition to contend with from foreign bounty-protected steamers. Considering, therefore, that so many millions of pounds are expended yearly on new tonnage, it is recommended and sincerely hoped this great capital will without delay be invested in the most efficient and economical steamers that can be built.

Rear-Admiral Capps, chief constructer of the navy, and Rear-Admiral Cowles, chief of the equipment bureau, are visiting the Pacific coast under special orders from the navy department to make a thorough inspection of the yards and stations there and to report upon the future needs of the navy in that field. Rear-Admiral Holliday, chief of the bureau of yards and docks is to follow them to San Francisco on a like mission. The resources of the Mare Island and Bremerton navy yards, the only ones on the Pacific coast, are not enough to care for the battleship fleet, even if it only makes a short visit to that coast, and suitable harbors will be examined with a view to the establishment of a naval station. San Diego, Cal., is said to possess many advantages for improvments of this kind.

GREAT EASTERN VS. CUNARDERS.

In the course of a paper on "Structural Development in British Merchant Ships," which was read at the Bordeaux International Congress, Mr. J. Foster-King said:

The Great Eastern, built in 1859, was 680 ft. by 83 ft. by 58 ft., is stated to have had no sheer, and no close-spaced transverse frames; the transverse members consisted of webs and bulkheads which averaged 16 ft. apart, only a few of them being extended to the outer shell. The tiers of beams below the upper deck were but little better than rafters for flooring, the shell plating was only ¼-inch iron (for which modern practice would call 12-20th steel the equivalent) stiffened by longitudinals 2 ft. 6 in. apart on the bottom, 5 ft. on the bilges and sides, and 7 ft. 6 in. apart on the top sides; there was an inner skin of ½-in. iron (equal to 8-20ths steel) extending up to the fourth deck, two longitudinal bulkheads of the same thickness which extended to the full deptth of the ship, stiffened by plate webs 5 ft. apart. The upper deck was in two layers of two thicknesses of ½-in. plating in combination with longitudinals 5 ft. apart, so that longitudinally she was a single-deck ship, having relatively narrow, but very strong, top members connected to the lower part of the structure by four films of thin plating, two of which are not stiffened inside the squares of about 16 ft. by 7 ft. 6 in., formed by the deck stringers and webs. The ship was riveted throughout with ⅞-in. rivets, all the plate seams were single riveted, and none of the butts had more than double riveting. There is no gainsaying the remarkable nature of these facts, and, after discounting the inevitable reduction in their importance by the influence of form, absence of sheer, great depth of hull, and relatively low speed at sea, there seems to be no escape from the conclusion that the lessons to be derived from this monument of sucessful structural design have not been applied in subsequent practice.

It is the custom to speak of the Great Eastern as being framed longitudinally, but this, of course, is not true in the literal sense of being framed longitudinally and no other way; and, as it is impossible to conceive a metal ship of any size without effective transverse members at sufficiently close intervals to permit of the stresses being transmitted thereto through longitudinal material of reasonable dimensions, it might be well to adopt some other nomenclature to show that such departures from ordinary framing systems merely indicate a widening of the distance between the transverse members. The Cunard steamers are 760 ft. by 87 ft. 6 in. by 60 ft., have sheer, the transverse frames are 32 in. apart, reinforced by web frames 10 ft. 8 in. apart; there are four complete steel decks, having beams 32 in. apart; the shell plating is 21-20ths to 20-20ths; there is an inner skin 15-20ths thick, extending 8 ft. above the keel, stiffened by 10-20ths longitudinals about 6 ft. apart, in addition to the transverse floors 32 in. apart; there are two longitudinal bulkheads 10-9-20ths thick, extending up the fourth deck, while the top member of the structure consists of two layers of thick plating connected to double topside plating over 2 in. total thickness. The riveting of the seams of shell plating is treble, and of the butts quadruple, with special double straps on the top sides. The Lusitania and Mauretania represent the latest and greatest development of a modern type, which, owing probably to the commercial failure of the older vessel, has not at any time been appreciably influenced by the example of the Great Eastern's structure, a type which probably shows less variation, less originality in conception, and greater excellence in execution than any other, probably because cost is not usually a paramount consideration, and it is a necessity of design that it be provided with as many decks as possible, consequently the modern tradition that the decks which are fitted under the upper deck are structural necessities has remained undisturbed in practice.

It cannot be said that the introduction of steel revolutionized shipbuilding, although it pushed progress faster, nor that the manufacturer has been ahead of the consumer, although there have been great developments since the days of the Buenos Ayrean, the first steel Atlantic steamer, in the number of sections and sizes of material available. In fact it was not until the Standards Committee took up the work two years ago that any attempt was made in Britain to systematize the form of steel sections, or to obtain reasonable proportions of web, flange, &c., to depth of section. It is to be hoped that standardization will not spell delay in further improvement in section design and development of sizes.

The cargo steamer seems to me to be the most important species of the genus ship not only because it is numerically the largest, but because it shows the greatest number of variations, and the greatest activity in developing these into distinct species. The ordinary large cargo steamer of 30 years ago was but a modification in dimensions of the temporary passenger and cargo type, ranging in length from 260 ft. to 280 ft., having two tiers of beams, a tier of wide-

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spaced hold beams, and, quite commonly, a double bottom. For smaller vessels the raised quarter-deck or well deck type, was practically supreme; but it seems unnecessary to deal with them separately, as they presented few special features in construction which have not since been embodied in the now paramount type having continuous decks. The raised quarter-deck has been of evolutionary value from the fact that the demand for the omission of complete tiers of beams in way of the quarter deck had to be faced and met almost from the beginning of that the introduction of web frames, as an efficient substitute for a third tier of beams in a three-deck, or a second tier in a two-deck ship, is now a matter of quite ancient history. The web frame ship was an improvement in design for bulk carriers, but the broken stowage for other trades created a demand which led to the deep-frame system being introduced, I believe, by Messrs, Stephen, of Linthouse, about 1887; that is, each frame was made stiff enough and strong enough for the longer spans caused by the omission of tiers of beams, These systems have been grafted upon one which gradually increased the sizes of ordinary frames in rough proportion to the midship dimensions of the ship, and introduced additional tiers of beams at arbitrary depths, so that anomalies are not unknown in practice. The developments in general design of the past 15 years, were the wider spacing of stanchions, and the omission of the wood deck from the second-deck level, an omission of valueless material which seems to have been at first generally, although not universally, regarded as one having such structural importance as demanded either compensation or freeboard penalty. That a wood second deck, cut by bulkheads and non-existent in the machinery space, could ever have been regarded as an effective element in the structure of a steel ship is one of those mysteries which appear to attend all evolutions.

The steamer Lincluden, 312 ft. by 42 ft. 4 in. by 26 ft. 3 in., so far as I know the first real single-deck ship of this depth, or near it, was built by Messrs. Furniss, Withy and Co., West Hartlepool, in 1896, and was considered to be a radical, if not a dangerous departure; but circumstances have more than justified the design, and this ship was the forerunner of a type which is now becoming comparatively common. A number of relatively large vessels have been built having wide-spaced strong beams in association with wide stringer plates at mid depth, but the largest vessels of ordinary form of which I know anything in which reliance is placed solely upon deep framing, unsupported by beams of any kind below the upper deck, have depths of 28 ft. 6 in. to 29 ft. 6 in. The range of development in this type is shown by comparison of this vessel with a single-deck steamer, 252 ft. by 43 ft. 6 in. by 23 ft. 6 in., of which a number have been built for service on the American lakes, and whose depth corresponds with the least for which three tiers of beams used to be the standard. We have already reached a close approximation in design to an open boat with a portable deck, and, if trade requirements demand it, we are yet far from having reached any limitation upon the dimensions of this type based on practical considerations. The evolution of the single-deck steamer from the three-deck type has been on clear, well-defined lines, but recently activity in designing new methods of construction and types of ship intended to solve the problem of combining large capacity and large deadweight on limited draught, with ample water ballast capacity, unbroken stowage, absence of hand trimmings for bulk cargoes, and simplicity of construction, has produced designs which are such variations from the parent ship as to form distinct species, and which have already had, in some cases, quite an evolutionary history. For example, in Mr. M'Glashan's ship there is no change in external form, but by the simple expedient of adopting two skins of plating it is possible, not only to carry a very large quantity of water ballast, having a higher center of gravity than the normal, but to secure such great transverse and longitudinal strength from material disposed of in the best position as to give the power of practically indefinite expansion in ship dimensions.

Mr. Foster-King then proceeded to describe and illustrate different types of cargo vessels, such as Messrs. Doxford's turret, Messrs. Priestman's self-trimmer, Harrowing and Dixon's cantilever, and the Ropner trunk. In concluding, he said: If attacked solely from the point of view of economy and efficiency of design and as a problem in engineering, unhampered by preconceived ideas of construction and trade requirements, it seems to be obvious that the natural design of a ship-shaped girder would be one which would have the material disposed entirely on the circumscribing walls, but misconceptions of true principles in design are unavoidable legacies from previous constructive methods. The influences which have caused persistence in bad disposition of longitudinal material are not easily understood, perhaps they follow from the influence of wood shipbuilding methods, while the retention of the name "main," as applied to a deck which was not the top deck, may have had the effect due to suggestion. We have certainly grown up amid the conception that numerous tiers of beams are natural, and that their omission demands compensation, instead of what seems to be the sound idea exemplified by Messrs. Brunel and Scott Russell half a century ago, that the ideal structure would have the longitudinal material massed on the upper deck, bottom, and sides; the transverse members would be of the simplest form and fewest number possible, with their contributory elements as far apart as the thickness of plating would permit; while additional tiers of beams or layers of plating would be regarded as unscientific and to be fitted only under compulsion of trade conditions, but that, when fitted, the best use had to be made of them as factors in the structural equation, in order to minimize what must necessarily be wasteful in weight, just as the central core of a shaft or any other massing of material in the wrong place. It appears to me that the tendency of all types of development, with the exception of the large mail and passenger steamer, has been towards reduction in number of parts, economy of labor, rather than of weight, to a probably unconscious realization of the principles of design which I have ventured to put forward as the best; and particularly in the case of bulk carriers to the closest possible approximation to an open boat—a design which seems to be not only the child of the ages, but the father of the ideal design for such vessels.

MODEL OF GJOA.

A model of the 72-ft. sloop Gjoa, in which Capt. Roald Amundsen made the only trip ever negotiated through the Northwest Passage around the American continent, was exhibited at the Maritime Exchange in New York recently. The model is eventually to go to the Smithsonian Institution at Washington. The original of the model is an old sealing vessel of the Norwegian type, 35 years old, of 49 tons burden, and is 72 ft. over all. The model is three and a half feet long and from the keel to the top of the mast it stands four feet. The original of the model now lies at the Mare Island navy yard and it has been suggested that she be the first vessel to pass through the Panama canal, thus making her the first craft to round the North American continent.

The steamer Calumet building for the Lackawanna Steamship Co. will be launched at the Wyandotte yard of the American Ship Building Co. on Saturday next.

Capt. Walter Scott, for two years shore captain of the Graham & Morton fleet, has been appointed harbor master for the port of Chicago.

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UNCLE SAM'S FOREIGN CRUISER.

The *Boston Transcript* in its issue of August 1, publishes an editorial relative to the chartering of Dunottar Castle by the United States government for service between New York and Colon in conjunction with the construction of the Panama Canal. The story could not be better told than the *Transcript* tells it, and for that reason it is published below in full.

The Dunottar Castle was one of England's crack liners during the South African war, having carried both Lord Roberts and Kitchner to South Africa. That a certain sentiment attaches to her is proved by the fact that the stateroom in which "Bobs" and the Sirdar planned the South African campaign has not been opened since and has been kept precisely as they left it. The Dunottar Castle is British all over, and the national regard in which she is held is a splendid thing. But why can't the United States create a similar sentiment about its merchant ships? Why doesn't it go about the business of getting a merchant marine of its own without chartering foreign steamships with coats of arms, uniforms and all that? It is not sufficient to say that there are no American steamships offering for the service. There would be plenty of American steamships offering if the American steamer was accorded fair play by its own government. The American merchant marine is imposed upon because it is feeble. The *Transcript* is right in saying that if the government imported the woolens to make uniforms for its soldiers such a clamor would be raised as would shake the very foundations of government. In fact, the government would not dare do such a thing. Why not? Because the textile industry is powerful, too powerful for any executive department to take liberties with it. The real trouble with the American merchant marine is that it is weak and therefore can with impunity be imposed upon. It is not a square deal to charter a foreign ship to perform a service that is wholly American; quite as much American in fact as the transfer of commerce from one American port to another. The Isthmian Canal Commission knew two years ago that it would want ships. Why did it not order them to be built in an American yard then? It knows that it will need ships two years hence. Why does it not order them now? Following is the *Transcript* editorial:

> Few of us, even in maritime New England, know that the American government is in the merchant steamship business—that is, it is operating, in the name of the Isthmian Canal Commission and the Panama Railroad, a regular line of mail, passenger and freight steamers from New York to Colon. Up to the other day this United States service was composed of American-built and American-manned steamers. But there has now appeared in the line a thorough-going British craft flying the flag of the royal naval reserve, with a royal coat-of-arms above the name Dunottar Castle on the stern, and officers and sailors walking the decks in the royal naval reserve uniform.
>
> This is an odd departure for Uncle Sam. It is almost as if our Navy Department had borrowed a cruiser, guns, men and all, from the British admiralty. The war department says, by way of explanation and defense, that before it chartered this British auxiliary cruiser for our national service it searched high and low for a spare American steamship among our coasting fleet, and the few American ships in over-seas service, and that it could not find one vessel disengaged.
>
> Doubtless this is true, but the war department is not altogether exculpated, for the need of another ship on this Isthmian line, if there is need, could have been foreseen a year or two years ago and a good American ship constructed. Unfortunately for the deep sea part of the merchant marine it is not a protected industry. Somehow nobody hears that the government of the United States is purchasing woolen cloth abroad for the uniforms of its soldiers and sailors, though it can be had a great deal more cheaply there, or buying foreign steel for armorplates or cannon. If the protective principle were thus invaded, the war department and the navy department know very well that there would be a sudden descent of powerful senators and representatives on Washington, and a remonstrance from the rich and formidable protected industries which would shake the national capital to its very depths. But American ship owners are not very numerous, and the industry as a whole is undeniably feeble.
>
> This Dunottar Castle, by the way, is herself the product of a protected industry and a British industry at that. She belongs to the fleet of the Union Castle Line, which for many years has been receiving a generous subsidy from the British and colonial governments. This subsidy at the present time is $650,000 a year. Ships in receipt of it must be built on designs approved by the British admiralty. So it happens that the Dunottar Castle, which the United States government has hired, is a British man-of-war masquerading as a merchantman. She is, however, a man-of-war for which the British admiralty has no present use—that is, she is 15 years or more old and is, therefore, regarded as antiquated in the British service, though quite good enough to loan to Uncle Sam. In the Boer war the Dunottar Castle, as a British troop ship, had the distinction of carrying out to the Cape not only General Buller, who failed, but Lord Roberts and Kitchener, who succeeded.
>
> For three years or more the Dunottar Castle has been laid up for sale on the other side, but the price asked was so high that she has found no purchaser. Now she is hired out to the United States, but it is significant that the Dunottar Castle in all essentials remains a British ship. She is in charge of naval reserve officers and naval reserve seamen, and only the servants are to be shipped from among American citizens at the port of New York. There was a time when an episode like this would have stirred the country, but we have grown used to seeing our flag whipped from the high seas—and there are those, though not of New England, who apparently enjoy the spectacle.
>
> The Dunottar Castle will carry out to the Isthmus the United States mails, materials, and supplies for the canal and such official and unofficial passengers as may chance to be going. Whenever she appears at either Colon or New York, she will be a reminder that we cannot get out to the American canal, which we are digging at such a huge cost of money, without hiring a steamship from abroad—and that when this canal is completed it may float few merchant ships but those of foreign nations, our rivals in trade and possible enemies in war.

RAID ON COASTWISE LAW.

The New York Maritime Register latterly published an editorial, the gist of which was that no appreciable injury would be worked to American ship owners if eastern shippers of coal were accorded the privilege of employing foreign vessels to carry coal to San Francisco. This editorial following immediately upon the chartering of foreign ships by the navy department for this very purpose was evidently inspired by quarters interested in breaking down the coastwise laws.

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This is one of the indications, of which there have been many of late, of a contemplated raid upon the coastwise laws of the United States. Probably the raid will take tangible form next winter. At any rate it behooves coastwise interests to be on the alert. Mr. Samuel S. Sewall of the firm of Arthur Sewall & Co., Bath, Me., answered the *Register's* editorial as follows:

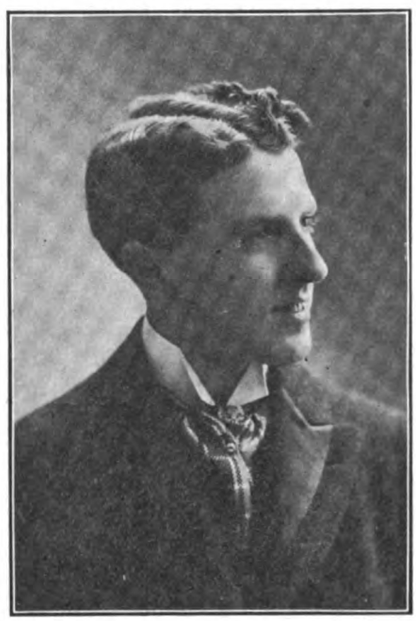
"Referring to your editorial entitled, 'Coal via Cape Horn' in your issue of July 17, 1907, the statement therein made that 'there are no American vessels engaged at the present time in that trade (coal) by way of the Cape Horn route' is at absolute variance with the facts, which certainly should be known to you who assume, at least, to keep in touch with American shipping. Your own weekly compendium shows that a good number of American ships are now en route from our Atlantic coal ports to San Francisco, Honolulu and Puget Sound. Included in this list are five ships, owned by my firm, carrying 22,700 tons of coal, and we have three more soon due to arrive at Atlantic ports from the Pacific via Cape Horn, and chartered to load 12,600 tons of coal outward again to the Pacific, via this route. My firm alone, therefore, will transport this year in American ships via the Cape Horn route to the Pacific ports of the United States 35,300 tons of eastern American coal. Very naturally, therefore, we resent your further statement that 'It does not appear under these circumstances that any injury to the American ship owner would result, if in this particular branch of the coastwise trade eastern shippers of coal were given the privilege of employing foreign vessels to take forward cargoes.' The result of such action by congress would simply mean the confiscation of all American deep water sailing ships in the interest of foreign ships largely and of eastern shippers of coal to a slight extent, but, at least, to the extent of the sacrifice of one American industry to another. The administration has already placed foreign ships in competition with our ships by chartering them to carry coal coastwise for the navy department in violation of all existing statutes and needlessly so in respect of the available supply of American tonnage as is sufficiently shown by the fact that the navy department has declined to charter several American ships during the past year, which were offered at rates as low as those it has since agreed to pay to foreign ships for the same voyages. It only remains for the press, led by such as your publication, which is supposed by the public to reflect the sentiments of American shipping interests, to fail to condemn the violation of laws enacted by congress for the benefit of American shipping and to urge the repeal of such laws to bring about within the shortest possible time just such a condition of the American Merchant Marine as will best suit our foreign competitors. The American ship owner is certainly as much entitled to the protection granted to him by the navigation laws as is the American manufacturer entitled to the protection granted to him by the tariff; yet we do not find the administration meddling very much with the tariff without the consent of congress. There is a reason.

"Yours respectfully.

"SAM'L L. SEWALL."

LEAVES TUG EMPLOY.

Mr. A. Heath Carr, who for the past five years has been assistant to Capt. Phillip Broderick, local manager of the Great Lakes Towing Co., resigned this



MR. A. HEATH CARR.

berth with the tug company on the first of the month to enter the employ of the Garlock Packing Co. Mr. Carr will act as marine salesman for his company with headquarters in Cleveland. His experience and faithful service with the tug company has made him a favorite with vessel owners, shippers and marine men generally, and his friends are scattered all over the lakes. Mr. Carr is an ideal man for this position and what is the Garlock Packing Co.'s gain is the tug company's loss. As a token of the high esteem in which he is held by his former associates the employes of the tug company have presented Mr. Carr with a beautiful diamond watch charm. The Garlock Packing Co. is one of the largest packing concerns in the United States.

ORE SHIPMENTS.

The fact that ore shipments to Aug. 1 are 530,373 tons greater than they were to Aug. 1 last year shows the tremendous clip at which ore was moving before the dock strike occurred. The movement during the first two weeks of July was phenomenal and had conditions remained normal July would have established a record movement for ore. As it was, however, the July movement fell 913,655 tons below that of July, 1906. The docks at the head of the lakes last year contributed 69.30 per cent of the movement up to Aug. 1, but this year their percentage has fallen to 44.07. Total shipments to Aug. 1, however, are 17,534,741 tons as against 17,004,368 tons for 1906. The August movement will not be record-breaking because things have not quite resumed their normal shape. Carriers were naturally congested at upper lake ports and many had to wait several days after the strike was declared off in order to be loaded. It will probably be ten days yet before ships and docks are working in unison. As far as the mines are concerned, the men are gradually returning to work and each day shows a little gain on the part of the operators. Present indications are that September will be the month of greatest movement on the lakes.

Following are the shipments for the month of July and up to August 1 with data for the corresponding periods of last year:

	July 1907.	Per cent of Total.	July 1906.	Per cent of Total.
Escanaba	988,664	20.39	827,097	14.35
Marquette	580,746	11.97	451,807	7.84
Ashland	657,750	13.57	490,596	8.51
Superior	762,753	15.73	917,761	15.93
Duluth	1,057,319	21.80	1,801,096	31.26
Two Harbors	801,885	16.54	1,274,415	22.11
Total	4,849,117	100.00	5,762,772	100.00

	To Aug. 1, 1907.	Per cent of Total.	To Aug. 1, 1906.	Per cent of Total.
Escanaba	2,812,879	16.05	2,565,505	15.09
Marquette	1,349,805	7.69	1,254,794	7.38
Ashland	1,707,107	9.73	1,679,359	9.88
Superior	3.081,664	17.58	2,671,536	15.71
Duluth	5,151,365	29.38	4,982,331	29.30
Two Harbors	3,431,921	19.57	3,850,943	22.64
Total	17,534,741	100.00	17,004,368	100.00

The tug Chicago tripped on the tow line while towing the package freighter Muncy up the Chicago river last week, rolling completely over and going to the bottom. None of the crew was hurt.

Capt. Thomas McGann of Racine, Wis., has purchased the tug S. O. Dixon from Edward Gillen.

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DOCK STRIKE SETTLED.

As announced in the last issue of the REVIEW the dock strike at the head of the lakes has been settled. Work ceased at Duluth, July 12, at Two Harbors, July 14, and at Allouez, July 15, resuming at all three docks on Aug. 1.

On July 31, President Olcott, of the Duluth, Mesabi & Northern railroad submitted the following communication to a meeting of the strikers:

Hon. M. B. Cullum, Mayor,

"City of Duluth.

"Dear Sir:—We are in receipt of the communication addressed to you, under date of the 29th instant, from a committee of ore dock employes of this company, and beg to say that said communication has had our most careful consideration.

"It is our desire to resume work at the docks at once and we shall be greatly pleased if the employes, after careful consideration, shall finally decide to go back. If they do, we assure you that there will be no discrimination against any of them and that no additional men will be employed until all of our old employes are given an opportunity to return to work, if they so desire.

"We desire to commend the dock employes for the peaceable and law abiding manner in which they have conducted themselves during the past two weeks and beg to assure you that if and when the strike is ended, it shall be our purpose to give the men, through committees representing all our employes, every opportunity of taking up from time to time, with the officials of the company matters of mutual interest and concern and to treat with them in all matters with the same degree of fairness that we have always accorded.

"We believe that the dock employes will find it for their own best interests to resume work and without delay. If, however, they decide otherwise, kindly say to them that we shall feel at liberty to employ other men permanently to take their places at once, much as we shall regret the necessity for so doing.

"So far as we know only two matters of difference exist.

"1. The question of open shop.

"2. The rates of wages.

"You and the men well know our position on this first question. For 14 years past we have consistently stood upon the broad policy that we have the inherent right to employ any man seeking to enter our service irrespective of whether he is affiliated or not with any organization or association and without regard to nationality. We believe our position here is unassailable and, in fact, as you will recall, the committee of our dock employes, in their communication to you dated the 27th instant, expressly disclaimed that they were making any demand upon us for the "closed shop" policy.

"In regard to the rate of wages, permit us to say that the present scale to be effective until Oct. 31, 1907, was the result of a verbal agreement between all the dock employes, represented by their own committee, and the company. This agreement was made at a conference at which eight men representing the employes were present and was thoroughly understod and assented to by both parties at that time and work at the docks was carried on for two months under the same. In our relations with our employes, as well as with the public, we consider a verbal agreement as binding and effective as a written one.

"We think that the dock men should show their good faith and intention to carry out their agreement made in May by immediately returning to work.

"Whatever the conclusions of these negotiations may be, we desire to express to you our sincere thanks for your untiring, impartial and public spirited efforts in attempting to adjust the difficulty and bring about peaceable and much to be desired solution of the matter, and assuring you of our personal regard, believe us,

"Very respectfully yours,

"W. J. OLCOTT, President."

The reply of the strikers to President Olcott's letter was as follows:

STRIKERS REPLY TO OLCOTT'S LETTER.

Duluth, Minn., July 31, 1907.

Hon. M. B. Cullum, Mayor City of Duluth.

Dear Sir:—We beg leave to acknowledge the receipt of Mr. Olcott's letter to you, in answer to our offer to submit the matters at issue between the ore dock workers and the Duluth, Mesabi & Northern railway to arbitration.

While the company did not see its way clear to accept our offer, we agreed, by unanmious vote, to accept the proposition of the company, with the verbal assurance given by you that the men at Two Harbors and Allouez would be treated in the same manner as the officials of the D., M. & N. railway agree to reinstate the men at the Duluth ore docks, and with the additional assurance that all would entertain committees from their employes to take up matters from time to time involving their welfare.

The men also insisted that the boarding cars and armed guards be removed from the docks. We presume there would be no objection to the presence of special police, who might be armed with the usual weapons of a police officer.

We desire to assure you that the men have the kindliest feelings towards the officials of the company, and we are pleased to note that they appreciate our behavior during the unpleasant controversy which is just meeting a most happy end. We desire to assure them, through you, that our attitude in the future shall be in accordance with every rule of propriety, which should mark the relation between employers and employes.

We have unanimously voted to report for work at 7 a. m. tomorrow, provided the conditions above referred to are acceptable to the companies involved.

Thanking you again for your untiring and patriotic efforts in behalf of our cause, and with reassurance of our kindly feelings towards our employers, we beg leave to remain,

Yours very truly,

Ore Dock Workers' Union of Duluth.
By (Signed) J. Thoresen, Wm. O. Perry, Theo. Lyons, Nelson Perry, J. W. Comer, Committee.

On Thursday morning, Aug. 1, at Duluth, about 240 men returned to work, obtained their old check numbers, seemed glad to get back and have been working ever since. On the night shift Thursday, 292 men reported, and on Friday morning the day shift increased to 258, some new men being hired, so that there are now at work 550 men as compared with 750 before the strike. All of the 750 were not necessary, however, simply being kept by the company so that the dock is now in shape to handle its full quota of ore, 100,000 tons daily. In the 24 hours, beginning Thursday morning, 1,710 cars were unloaded as compared with the usual number about 2,200. The ore which had been standing in the cars subject to sun and rain has baked pretty hard on top and made the handling on the dock a little more difficult. On Thursday, both day and night shift, the full schedule of ore was shipped from the Hull-Rust pit, 200 cars being loaded, but this was practically all that was sent down from the Hibbing district.

The conditions on the other docks are almost identical with those at Duluth. The crews are somewhat shorthanded at present because of the migration of the old men, but other men are available. There will be no further hindrance to shipping because of the docks. An effort is being made to load those boats which have been waiting longest as quickly as possible but the right cargoes are not always available from that ore which has been standing on the tracks and boats are still forced to wait for mine shipments.

With shipping again made possible through the resumption of operations at the docks, a more determined effort is being made to mine ore. The number of miners returning to work is increasing daily. While no accurate figures are obtainable probably very close to 75 per cent of the miners are now working, 10

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per cent have left the range and the remainder include those who are afraid to work and the ones who are causing the trouble. Rumors of violence and exciting encounters are numerous but there seem to have been no instances where the strikers have failed to comply with the orders of the deputy sheriffs.

Parades have been stopped by the sheriffs and meetings of the strikers where speeches considered threatening were being made have been broken up. The strikers have resented what they term this unjustifiable limitation of their rights and without question they have been handled with little gentleness so that a good many hot words and some threats have been passed. Armed outbreaks by the strikers are frequently spoken of but evidences are almost altogether lacking even in the most turbulent centers. Many weapons are undoubtedly being carried and with the uncertain tempers of these classes are always dangerous things but any general resorting to armed enforcement of their demands by the idle men seems entirely improbable.

The precautions taken by the sheriffs have been very prompt almost to the anticipating of every move of the strikers and though unusually severe and stringent and practically to the limit of their rights have been endorsed officially and popularly throughout the state.

This strike has an unusual degree of disagreeable uncertainty about it. If the men were a unit in their dissatisfaction it would be a case of settling with all or none and the mines would operate or would not. As it is, with the large majority willing to work, and with no possibility of any accession to the demands of the trouble-making minority, there will continue to be this element of malcontents who, even if they do return to work, will maintain a situation of which the present outbreak is but the virulent form. There seems to be a great deal of justice in the opinion that Teofillo Petriello, the man who has been practically the sole leader and inspiration of the strike might have done much more for his countrymen were his motives truly unselfish, than by arousing in a previously satisfied and prosperous community a feeling of discontent and antagonism that at best will require a long time to eradicate.

During the week President Cole and General Manager Mitchell, of the Oliver Iron Mining Co. spent a couple of days personally looking over the situation. It is significant that immediately following a night shift was started at the Hull-Rust which action may be taken as indicative of a returning confidence in the security of operating. There is no longer a single locality entirely shut down as was the case a week ago and the return to normal conditions will probably continue slowly for many of the strikers under the influence of their leaders still show considerable stubbornness.

The shipments for the month of July, this year, are probably one-half what they would have been from the three docks though 2,621,956 tons were handled. Of this the Mesabi dock moved 1,057,319 tons, as compared with 1,801,096 tons last year. Two harbors 801,884 tons, against 1,274,415 tons in 1906 and Allouez 762,749 tons, against 917,761 tons a year ago. This shows a total loss due to the strike compared with last year of 1,371,316 which still leaves the docks with a net gain in 1907 over 1906 of 160,204 tons.

BUFFALO'S HARD COAL SHIPPING FACILITIES.

Editor MARINE REVIEW:—It may be news to many of your readers that there has been no improvement in hard coal shipping facilities of Buffalo in many years, and the amount of hard coal shipped has not varied very greatly in the past ten years, except during the season of the great strike in the hard coal mines. The number of docks shipping hard coal is now reduced to four. The dock formerly known as Coxe Brothers has been out of commission since the close of the season of 1905. The Lehigh Valley Coal Co.'s dock is situated at the head of navigation in the Blackwell canal. Below the coal dock is the Buffalo creek bridge. The draw or passage is 54 ft. wide at the surface, but owing to the sloping banks; 50 ft. is the greatest width available for full loaded boats. The Philadelphia & Reading dock in the Erie Basin has good facilities for loading, but on account of its situation, cannot to advantage use large boats. There is nothing in the situation of the Lackawanna or Erie coal docks to interfere with large vessels loading at them, but, in common with the other coal shipping trestles, they are not high enough, nor are their dock spouts long enough to enable them to load large boats to advantage. About 52 ft. abeam and 28 ft. hold is the largest boat they can load profitably, and those docks would prefer boats not over 50 ft. beam. Apart from the question of the size of boats and the facilities of the docks for handling large boats, there is the fact that it is a rare thing that a cargo of more than 7,000 or 8,000 tons can be accumulated at one time, as the hard coal comes in five different shipping sizes.

The annual shipments of hard coal by lake from Buffalo amount only about two and a half to three million tons, and it does not seem probable that there will ever be any material increase in the quantity.

Yours truly,

BROWN & CO.

VIOLATING ST. MARY'S RIVER RULES.

Editor MARINE REVIEW:—A great many vessels have recently been reported for violation of the St. Mary's river rules, particularly Rules I and II and I have posted notice to masters in the lock office at the Sault, calling their attention to two of the most prolific causes for report: running too fast through Little Mud lake and large vessels passing small passenger boats in prohibited waters. Many masters have expressed surprise that they had violated the rules in passing such vessels as the Elva, John Haggart and International (all in the vicinity of 100 tons) in the cut channels—sometimes without giving any signals. That they did not realize that they were violating the rules by passing these small vessels is evidenced by the fact that several have done it right in front of lookout stations. The practice is becoming more and more prevalent for vessels to speed up through Little Mud lake when there is nothing in the way some of them going as fast as 14 miles an hour. The rule makes no allowance for a clear way and I have no authority to modify any of the rules. If you would bring the matter to the attention of your readers you might save several from incurring fines.

Respectfully,

C. E. JOHNSTON,
1st Lieut., U. S. R. C. S., Comdg.

DREDGING IN LAKE SUPERIOR HARBORS.

The United States lake survey has received from Maj. Graham D. Fitch, United States Engineer at Duluth, the following report concerning dredging at Lake Superior harbors. At Port Wing work completed July 25 provided a channel 15 ft. deep and 90 ft. wide from the lake through the entrance to a point 100 ft. in from inner end of east pier. The middle line of deep water passes parallel to and 50 ft. away from the east pier. Private dredging is in progress to deepen the channel farther in along the lumber docks.

At Ontonagon, dredging to be completed about Aug. 1 will give a channel fully 13 ft. deep and 100 ft. wide from the lake and through the entrance, the middle of best water being 75 ft. from face of west pier. Somewhat narrower channels, with the same depth, will lead from the entrance piers to the wharves on each side of inner harbor. Private dredging has been done close alongside the wharves.

The steamer M. A. Hanna has the distinction of delivering the first cargo of iron ore to the new port of Indiana Harbor. She delivered 6,000 tons of iron ore last week.

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OUR COURSE FINDER.

The MARINE REVIEW COURSE FINDER is a course finder in every particular. Every other work or device used for this purpose requires a lot of figuring, but not so with this work; the book does the figuring for you. The method employed is simply explained and is easily understood so that one has the opportunity of verifying the work; making it almost impossible for an error. Even where one does not know the least thing about the system he can use it just as well as another who knows all about it, for the book will do just what its name calls for. In other course finders you have got to do the finding but not so with ours, it does the work itself.

We can say without exaggerating in the least, that this Course Finder will prove of more practical and every-day usefulness than any publication designed for lake men. It can be used almost every hour of the day and night, and in usefulness it is only superseded by the compass itself. It is really a necessary auxiliary to the compass. With the two one is able to do things that are difficult for a mathematician to do.

The books are going fast and our book department is kept busy sending them out. Get your order in at once and have the benefit of a good thing. You'll surely want one in the course of time, so get busy. The book is $2.50 carriage prepaid, sent to any address. If not found just as we have here represented you have the privilege of returning and getting your money back. To responsible parties we send the book on approval.

CORRECT MAGNETIC CHARTS.

Every man in command of a boat should have a set of Correct Magnetic Charts of the more important harbors. These charts will be found to be of the greatest service in ascertaining the deviation of your compasses. These charts are drawn on a large scale and are perfectly accurate. They are different than any other harbor chart in that they show the positions, names and correct magnetic bearings of all the lighted ranges of the more important harbors. What makes them so useful and needful is that each range is drawn, marked and the correct magnetic bearing printed along the bearing line. It is the true bearing corrected for the variation at that place so that all that is necessary is to place your boat's head on that particular range and when steady on the range the difference between what your compass says and the correct magnetic bearing printed on the range is the deviation of the compass. What could be more simple than this?

A few every-day examples will better illustrate the system: Light on SE end of Chicago breakwater in range with Chicago Waterworks crib N ¾ E (S ¾ W). Chicago Waterworks crib and 4-Mile Waterworks crib in range SE (NW). There are about 20 lighted ranges given for Chicago so that they can be used in the night time as well as in the day time. They can be used better in the night time than in the day time. Now, to show what a simple matter it is to shape a course to any place you want to go to: Supposing you wanted to shape a course to Pt. Betsey from Chicago and you did not know what it was by your compass. Get light on SE end of Chicago Breakwater and Chicago Waterworks crib in range over stern and when steady on the range note compass course, and from whatever course shown at that time port ⅜-pt. from it and it will fetch Pt. Betsey at the right distance off. By this system one is able to shape courses to any place on the lakes with the greatest ease and with perfect accuracy. The convenience of these charts are in their size, everything showing up plainly and the bearings are printed in large type, and are therefore, easily read. By the use of them you cannot possibly make a mistake in getting on the wrong range or in getting the wrong bearing. These charts are printed on the best quality of linen paper and will stand the wear without tearing, and should last a long time. Since a chart of this kind will be much in use and handled a great deal, it was to meet this requirement that a linen cloth was used. We have printed and ready for delivery these charts of Chicago, Cleveland and Buffalo. We are selling the three for $1.00, or 50c for any one. A set of these charts with the MARINE REVIEW Course Finder will simplify the perplexities of a deviated compass. Just try it and prove it to your own satisfaction.

QUESTIONS FOR WHEELSMEN AND WATCHMEN.

ELEVENTH INSTALLMENT.

119. You are steering W x S when you pick up the green sidelight of another steamer bearing SW. A few minutes later you take another bearing and find the same green light bearing SW. What will happen if each of you hold your course? What is the duty of each?

120. You are steering ESE and at the same time you pick up the red light of another steamer four points on your starboard bow, and you are in close quarters. What should you do?

121. Supposing in the above case you were some distance from the red light so that you could with safety run several minutes before it was necessary to take action, and you found by a second bearing that the red light bore SSE. By each continuing your course would the other fellow cross ahead or astern of you?

122. Supposing under the same conditions you found by a second bearing that the red light was drawing ahead; then each continues course, which one will pass astern of the other?

123. Seeing the head and after lights and at the same time one of the sidelights of another steamer, how could you determine approximately the direction she was heading in?

124. The bearing of a red light from you is SSW, and at the same time the head and after lights are open about two points, about how is this steamer heading?

125. You are steering ENE with the wind fresh from the north, and very dark; about four points on your port bow you observe the bearing of a green light of a schooner. You are some distance from the light and have run a few minutes when another bearing of the green light shows that it is drawing ahead, what should you do?

126. The wind is NE and thick; you hear the three blasts of a schooner's fog horn on your starboard bow, but far away. You are steering NE x E and on taking a second bearing you find that the schooner is drawing more ahead. How is this vessel heading about and is she crossing your course?

127. Under the same conditions supposing when you take the second bearing you find the fog blasts have drawn astern, about how is she heading and is she crossing your course?

128. When would you deem a cross-signal safely to be used?

129. If you could see a green light and at the same time the green light is turned away from you so that it is shut out entirely, which way is this boat's head being turned and which way is her helm?

130. Supposing under the same conditions you could see both the sidelights after observing the green light alone, which way is this ship turning and which way is her helm?

ANSWERS AND QUESTIONS FOR WHEELSMEN AND WATCHMEN.

EIGHTH INSTALLMENT. PUBLISHED JULY 11.

85. When the wind bears anywhere abaft the beam on either side to those on board. It is when the main sheet can be slacked off or away and the vessel is still able to make her course.

86. A vessel is sailing closehauled when her head is as near to the wind as it can be and she is still able to make progress. It is as close as a vessel can sail against the wind, that is, as close as she can head to the wind.

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87. No. A vessel may be able to sail as close to the wind as four points. With the wind anywhere for'ard of the beam she could sail anywhere within eight points of the wind. The law governing the rules of the road, however, is the same for a vessel running closehauled as with the wind anywhere for'ard of abeam.

88. Yes.

89. To port.

90. Moving or shoving it over to the port side.

91. To starboard.

92. One blast meaning that I am directing my course to starboard, by putting my helm to port; two blasts, that I am directing my course to port by putting my helm to starboard.

93. That I am going to starboard (by porting helm).

94. That she is on the starboard tack with the wind anywhere for'ard of abeam.

95. She will take the starboard side, and have the other boat on her own port side.

96. A cross-signal is where one blast is answered by two or two blasts by one. A cross-signal is sometimes blown when one pilot misunderstands the signal of another pilot. That is, one pilot may think that the other blew two blasts when he only blew one, or vice versa. According to law a cross-signal is not permissible. In case of a pilot not understanding the signal of another instead of blowing a cross-signal, or to take the chances of blowing a cross-signal, he should first blow an alarm-signal. This indicates to the other pilot that he is not understood or that he does not deem it safe to pass on that side. Under these conditions both boats must check down and stop until they come to an agreement. Or in case they are in dangerous quarters one must give way to the other for the safety of both.

QUESTIONS FOR MASTERS AND MATES.—NO. 39.

551. What is the difference in latitude between Duluth pierhead light and Chicago breakwater light?

552. What is their difference in longitude?

553. What is their actual difference in time?

554. What is the difference in their standard times? Why?

555. A ship from lat. 32° 40′ N sails to lat. 20° 47′ N, what is the diff. of lat. made?

556. What is the difference in latitude between Buffalo and Chicago?

557. What is the difference in longitude between these places?

558. What is the length of a minute of latitude in nautical miles?

559. If a ship starts from long. 81° 19′ W and sails to long. 86° 49′ W, how much has she changed her longitude, and which way has she gone, east or west?

560. The compass course is south, the wind WSW, the leeway ¾-pt., the Var. 16° Ely and the Dev. 14° Ely, what is the true course the ship has made?

SHIFTING FOR GRAIN CARGOES.

One of the considerations which make the vessel owners slow to offer their boats for grain even though the rate may be a fair one as compared with ore, is the probability that the boat in getting her cargo will have to shift from one elevator to another involving delays in loading and possible tug bills. Especially is this true of the boats of smaller tonnage. Seldom however does such an extreme case arise as is illustrated by the accompanying diagram.

The boat in question having a capacity of about 2,200 gross tons loaded grain at one of the Lake Superior ports getting a cargo of wheat for two different shippers, the entire cargo containing

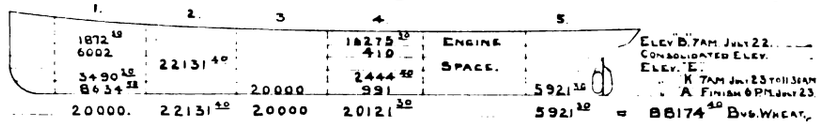

DIAGRAM OF A GRAIN CARGO TAKEN FROM LAKE SUPERIOR RECENTLY.

88,174 bu. and a few pounds over. The total time elapsed during loading was 35 hours. As shown by the diagram the boat had five hatches and began loading at Elevator "B" at 7 A. M. Monday receiving 1,872 bu. and 50 pounds in No. 1 hatch and 16,275 bu. and 50 lbs. in No. 4 hatch. She then shifted over to the Consolidated elevator where 6,412 bu. were received in two hatches as shown. The second shift took the boat to elevator "E" where one shipper's entire cargo was received in hatch No. 2 and the third shift to elevator "K". By this time it was Tuesday morning. To load the 3,490 bu. in hatch No. 1 and the 2,444 bu. in hatch No. 4 at "K" required in actual loading time 4½ hours as compared with about 6 hours for loading 35,547 bu. in four hatches at elevator "A" after the fourth and last shift.

The sketch is a longitudinal section of the cargo hold and illustrates very clearly the balancing, and placement of the cargo as well as the loading record. Such extreme cases of slow loading and scattered cargoes are not frequent but present an interesting instance of possibilities.

WRECK OF ARMENIA A MENACE.

The steamer Gen. Williams of the United States lake survey has examined the wreck of the schooner Armenia in Lake Erie about 3⅜ miles N. W. by W. of Pelee Passage light and about the same distance N. ¼ E. of Pelee Island light. Depths of 23 to 26 ft. prevailed over the wreck, but one small spot showed only 15½ ft. This finding shows the wreck to be still a dangerous menace to navigation, as it lies almost directly in the course from Detroit river light to Pelee Passage, and is not lighted. The buoy marking the wreck is still in position, a little to north and eastward of the remains.

STEEL TUG FOR MAJOR FITCH.

The Racine Boat Manufacturing Co., Muskegon, Mich., will build a steel tug for the use of Major Graham D. Fitch, government engineer, with headquarters at Duluth. All bids as originally submitted were in excess of the appropriation, but the specifications were later amended to permit the Racine Boat Manufacturing Co. to construct it within the limits of the appropriation. The tug will be 85 ft. 6 in. over all, 74 ft. 6 in. keel, 21 ft. beam and 11 ft. 6 in. deep. Her engine will be fore and aft compound with cylinders 16 and 34 in. diameters by stroke of 26 in., supplied with steam from a boiler of the firebox type 8½ ft. diameter and 14 ft. long. She is to be delivered next spring.

IRON SITUATION.

The adjustment of the labor troubles at the head of the lakes has removed a source of apprehension over a possible ore shortage from the iron and steel industry, and the surprisingly good record of shipments for July, considering the interruptions, has helped to allay any distrust over the situation. The contract for the steel for another lake vessel was placed during the week and it is expected that orders for several others will be booked shortly. The plate demand continues very strong. Finished lines generally are in a very satisfactory condition, but pig iron continues dull, although prices are well maintained. The monthly blast furnace statistics of THE IRON TRADE REVIEW for July show a production of 2,257,993 tons, compared with 2,237,420 tons for June, an increase of 20,573 tons.

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PORT COLBORNE HARBOR.

DeWitt Carter of Port Colborne, Ont., has recently contributed to the Welland Telegraph a comprehensive article on the harbor of Port Colborne and canal enlargement. It is as follows:

Port Colborne, being the Lake Erie entrance to the Welland Canal, is one of Canada's national harbors. The Dominion government, through the Departments of Railways and Canals and Public Works, have expended a large amount of money on deepening the harbor and enlarging it by building two large breakwaters, which protect and make the outer harbor. In this outer harbor they have constructed two large piers for elevator sites. On the western pier the government is now building one of the finest and fastest working transhipment and storage elevators in the world. It is to be built wholly of steel and cement, and will be practically fire-proof. It will have four unloading legs with an hourly capacity of 20,000 bu. each. When completed it will put our water route on an equality with the United States route, via Buffalo, down to this point. The largest bulk freight steamers on the upper lakes can quickly unload their grain cargoes here and then go to some Lake Erie port and reload coal for the head of the lakes. From here to Montreal the grain can be shipped in barges whose running expenses are much less per day than steamers. Though the barges cannot be towed as fast on the lakes as steamers usually run, they can make just as fast time in the canals, therefore their earning powers in the canals are greater when compared to their earning powers on the lakes than steamers. For the past twenty-five years St. Lawrence River barges have been towed between Kingston and Lake Superior, carrying grain, and during all that time only one has been lost, and that was near the head of Lake Superior, through an accident. They have proved themselves seaworthy craft on all our great lakes. When these barges are loaded with grain here they can deliver it to ocean steamers at Montreal.

The Welland Board of Trade, and especially some of its members, have questioned the advisability of the government building a transhipment and storage elevator here, and with other boards of trade throughout the country have strongly petitioned the government to enlarge the Welland canal as the best means of reducing the cost of transportation of grain and other products from the interior to tide water. If we are to have another era of canal enlargement as a means of reducing freight rates and increasing traffic, by all means commence at Montreal and work west. Our latest Dominion statistics show that for the last fifteen years there given, that less than 55 per cent of the freight that passed down through the Welland canal for export passed out through Montreal, while over 45 per cent went by United States ports, practically all through Ogdensburg. During this period scarcely nothing has gone through the Erie canal from Oswego. When the thousand ton barge canal, now being constructed between Oswego and New York, is completed, the St. Lawrence route will have a strong competitor for grain passing through the Welland canal. Therefore if it is a national interest that Welland Board of Trade takes in our all water route, it should take up the matter of canal improvement east of Kingston, instead of west. Kingston Board of Trade sent out a copy of a resolution which was adopted by Welland Board of Trade and many others. This resolution showed through the juggling of figures as to the distances, carrying capacities and freight rates that by enlarging the Welland canal, so that the largest upper lake steamers could carry full cargoes from Lake Superior through to Kingston, that the freight between Port Colborne and Kingston would be reduced to ½c per bushel. If such a reduction can be made by enlarging the Welland canal, why not enlarge the St. Lawrence canals and thus eliminate transhipment between the head of the lakes and Montreal? The Kingston resolution did not ask for improvements on the St. Lawrence canals, they merely desired transhipment at Kingston instead of at Port Colborne. Like the promoters of the Georgian Bay-Ottawa canal, they ignore three prime factors, namely,—time, risk of damage, and return cargoes.

"I do not believe that the enlargement of the Welland canal would materially reduce the rate of freight between Port Colborne and Kingston. I have several reasons for this conclusion, but I shall give only the following, as it will be most easily understood: The important factor in water transportation is time, especially with large and expensive steamers. When they figure on a freight they reckon the time from the moment they commence to load a cargo until they deliver it and reach a point where they can reload another. The rate of freight per bushel from the head of Lake Superior to Buffalo this season has been about two cents for wheat; from the head of Lake Superior to Kingston four cents, and to Montreal six cents. It takes about four days to make the run from the head of Lake Superior to Buffalo; eight days from the head of Lake Superior to Kingston and return to Lake Erie; and twelve days to Montreal and return to Lake Erie. You will see from the rate of freight and time taken on the trip to the three different ports, that the charge is ½ cent per bushel for each day over these routes. The freight rates paid on the upper lakes govern largely the rate paid to Kingston and Montreal. Now, unless you can materially reduce the time that it now takes a steamer to go from Port Colborne to Kingston and return to Lake Erie I cannot see why the rate of freight would be reduced by enlarging the Welland canal. It is not reasonable to expect that the large steamers will carry freight for less per day between Lake Erie and the foot of Lake Ontario, than they would carry it for on the upper lakes. In giving the time of the steamer that delivers her cargo at Kingston as eight days I figure it up to the time she will arrive back on Lake Erie, where she must come to place herself on an equality with the steamer that goes to Buffalo, because there are practically no return freights from Lake Ontario. Steamers are returning up through the canal light every day, and going to Buffalo or some south shore port on Lake Erie to load coal for Lake Superior.

"While Canada during the past quarter of a century has been expending millions on canal enlargements, our competitor, namely, Buffalo, has merely improved and deepened her harbor, provided fast unloading facilities and elaborate storage for over twenty million bushels of grain, and through these improvements has constantly diverted traffic that should have passed through our canals to the seaboard. With this precedent within twenty miles of our harbor, I feel certain that time will show the wisdom of those who have assisted and encouraged the government to make the much needed harbor improvements and build an up-to-date transhipment elevator here.

Yours sincerely,

DEWITT CARTER.

Port Colborne, July 26, 1907.

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PLEA FOR SHIPPING AID.

President Wm. Livingstone of the Lake Carriers' Association recently made an interesting plea for governmental aid to shipping in the foreign trade before the Michigan Bankers' Association. No man is better informed on the general subject of lake commerce than Mr. Livingstone. He pointed out clearly what wise laws and beneficent legislation have done for the great lakes and presented it forcibly to the understanding of his hearers as to whether similar action in relation to foreign trade would not bring about corresponding results. He said:

"I want you to do what was done by the American Bankers' Association, to pass resolutions in favor of the merchant marine of the United States. President Roosevelt, Secretary Root, Secretary Cortelyou have all in most strenuous words and terms urged congress to act upon that particular question. We lost what was called the subsidy bill at the last session of congress by just twelve votes. I want you to understand first, clearly and concisely, that on the lakes here we do not require anything. We have got everything possible that we could ask for. The wisdom of our fathers over a hundred years ago provided such regulations and such safeguards that we are entirely protected here in the great lakes, and the result is that we do not need anything. We have nothing to ask for.

"As a matter of fact, over one-half of the steamers of the United States enrolled today under United States register of a thousand tons and upwards are on the great lakes. We have the greatest commerce in the world, bar none. Therefore, I can come before you tonight and urge in the near future at the next session of the congress of the United States. The result—I don't care to go into figures tonight, on account of the limited time and on account of the evening—you want this for enjoyment and not for serious talk—but I propose to take the few minutes allotted for serious talk for the young men here tonight and from the fact that the American Bankers' Association has twice, in resolutions, advocated the passage of that matter. Thirty years ago they turned down a proposition that was advocated in congress, for $5,000 a year for—call it subsidy, call it anything you please—to establish the Merchant Marine of the United States, amounting to $150,000 in that thirty years, and the result is that it has cost the United States over three billions of dollars because they did not grant it at that time.

"Go back, for instance, if you please, to the days of the Phoenicians. For a thousand years the commercial standing of the world rested with them, with the Romans for a millennium, with Venice for seven hundred years, with the Portuguese for over three hundred years, and for many years back with Great Britain until recently, the United States, our own country, has wrested the commercial supremacy from Great Britain, and the commercial supremacy today rests in the United States. We are going to expend somewhere from three hundred to five hundred millions of dollars in completing the Panama canal.

"I want you to understand clearly, so that you will make no mistake in my position, that I am heartily in favor of the Panama canal because of what it will do, because I believe in everything that will be the able support of the United States of America against all foreign nations of the world, no matter what it costs; it is cheap at any price. And I remember most vividly at the time of the Spanish war, when the battleship Oregon left San Francisco and when the whole country, not knowing where the Spanish fleet was at that time, would have given untold millions to know that she was safe on this side and near Santiago, and I remember when she reported at a life-saving station, near the coast of Florida, that they were all ready for duty, that this great United States drew a long sigh of relief and said: 'Thank God for the Oregon!'

"But what is the result today? In 1820, and a little later than that, over ninety per cent of our foreign commerce was carried in American ships. The statistics show that in the last year, 1906, that in the great commerce which we ought to have as the greatest nation of the earth, we had less than eight per cent. In other words, the amount of freight that was paid—I will put it this way. We have the greatest railroad mileage in the world, we have the largest amount of navigable rivers in the world, we have the greatest sea coast of any country in the world, we run down to the pillars of Hercules and clear down to Trebizond, notwithstanding all that, our railroads, our navigable rivers, we bring the freight to our seaports to carry it abroad in foreign ships, and I put the question to you, young men and old men, here tonight, What would you think, for instance, if a large department store, with unlimited capital in any of our large cities in this United States were to hire in the delivery of their goods the wagons of some competitor to deliver their goods? May I ask you in all seriousness how long that concern would last?

"I believe that our American ships should penetrate every sea in this wide world and bring back the products of every clime.

"Within two years Great Britain granted to the Cunard line $13,000,000 to build two steamships and, in addition to that, gave them a million-dollar subsidy besides. I refer now to the Lusitania and the Mauretania, the two types of steamers which have recently come out. Go to the Pacific and what do we find? We find the flag of the sun, little Japan, which flies around to the coast of Korea and in the blue Pacific. The sun flag absolutely controls the people of the Pacific, and they are in a position to demoralize the few American ships there.

"The foreign trade has grown now to almost three billion dollars. Let us trace this, if you please, through the commerce here on the lakes, and show you the wisdom of our fathers, as far as that was concerned, over a century ago. The result is taken up to the present time, July 1, 1907. The result shows that on the average the tonnage that will pass up and down the Detroit River in the year 1907 will be over 75,000,000 tons. And I want you to bear in mind that that is nearly six times the tonnage that goes through the Suez canal, about which we hear so much. The Suez canal has 360 days in the year, and we have on an average 240 days. We are ice-bound the balance of the time.

"I am talking now about the present, not the past; I am talking about this present year, 1907. The result is that we now have 150,000,000 invested here on the lakes, and that crossing the Lime Kilns, which takes all of the commerce of the lakes practically, that for every minute in the twenty-four hours, that for every single minute in the twenty-four hours during the season of navigation, an average of over 300 tons will pass that particular point. I merely speak of this in the way of contrast. I merely want to say this by way of comparison, that under the beneficent rule of our fathers of a hundred years ago, it has grown up to that point. We have built up the largest traffic in the world, the largest tonnage in the world. If you take, for instance, this year, to illustrate a moment, so that

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you will get the comparison, taking the freight that will pass down the Detroit River, and if such a thing were possible, which, of course, would be impossible, if we go over to Rome, to Madrid, to Constantinople and around the globe and across to San Francisco, and, assuming that every freight car carried forty tons, and by the time that train got around with this 75,000,000-odd tons of freight, when the last car was leaving New York the locomotive would be almost into the city of Chicago. Now, then, if that is the case as far as the great lakes is concerned, is it possible that all the wisdom of our fathers of a century ago died there, and that there is not today sufficient statesmanship in our members of congress, and if it will enact such laws in such a way that it would broaden the commerce, that it would enable the United States to attain the supremacy which they ought to have as the greatest commercial nation on the face of the earth.

"In connection with that, I want to say in conclusion that every ship that goes up the lakes has been furnished by American capital, in American ship yards, by American material and by American labor, and at the masthead of every vessel that goes up and down these lakes flies the American flag."

MORE FREIGHTERS ORDERED.

Capt. W. C. Richardson of Cleveland, has given an order to the American Ship Building Co. for a freighter for 1908 delivery. Except for the fact that she will have 2 ft. more beam, the steamer will be a duplicate of the David Z. Norton, which Capt. Richardson regards as one of the best bulk freighters on the lakes. The new steamer will be 500 ft. overall, 480 ft. keel, 54 ft. beam and 30 ft. deep, and will have triple-expansion engines and Scotch boilers. Her hatches will be 12 ft. fore and aft and spaced 24 ft. centers. It is expected that her extra beam will enable her to carry about 500 tons more than the Norton, or in other words about 9,000 tons.

Mr. W. H. Becker of Cleveland, has closed contract with the American Ship Building Co. for a new freighter for 1908 delivery to be 524 ft. over all, 504 ft. keel, 55 ft. beam and 30 ft. deep. It will be noted that her beam is one foot in excess of the ordinary beam of vessels of these dimensions. The steamer is promised for next April.

Mr. Harvey L. Brown, of Buffalo, has given contract to the American Ship Building Co. for a bulk freighter for 1908 delivery to be a duplicate of the steamer recently ordered by his father, Capt. J. J. H. Brown. She will be 524 ft. over all, 504 ft. keel, 54 ft. beam and 30 ft. deep, having triple-expansion engines and Scotch boilers.

NEW RECORD MADE

New York, July 30.—All records of the United States Steel Corporation in the manufacture of steel were shown to have been broken today when the company's report for the quarter ended June 30 was made public after a meeting of the board of directors.

The report shows that the company's total net earnings for the spring quarter were $45,503,705, a high water mark record for any single quarter in the company's history. This record-breaking total is an increase of $5,378,672 over the corresponding quarter last year. The amount of unfilled business on hand June 30 was 7,603,878 tons, an increase of 794,289 tons over last year.

The statement also shows that $18,500,000 was set aside after all charges, interests and dividends were paid, for new plants, additional property and construction. This is an increase of $5,500,000 as compared with the appropriation for the same purposes for the quarter ended June 30, 1906.

After the meeting, a representative of the corporation said orders booked during July were 25 to 30 per cent less than those of the same period year ago. No change was made in dividend rate or officials.

CHEROKEE LAUNCHED.

The twin-screw steel steamer Cherokee building for the Muskoko Lakes Navigation & Hotel Co., was launched July 24 at Gravenhurst, Ont., and was christened by Miss B. Phillips, a daughter of Mr. F. B. Phillips, first vice-president of the company. Mr. James Thomson had charge of the work for the Canadian Ship Building Co. Mr. Thomson is well known on the lakes having been for a number of years with Wheeler at Bay City and later with the Superior Ship Building Co. and the Collingwood Ship Building Co. The Cherokee is 123 ft. over all, 22 ft. beam and is driven by triple-expansion engines.

USE OF NEW AMBROSE CHANNEL.

The war department has rendered a decision in regard to the use of the Ambrose channel by the large trans-Atlantic steamships entering the port of New York. The work of dredging is still in progress under the direction of the corps of engineers and the question arose as to whether the new Cunard liner Lusitania, which is shortly to make her first trip across the Atlantic, would be able to use the channel. The war department has announced that it will permit its use by deep draught vessels which are likely to experience any difficulty in the use of the present route. The request of some of the trans-Atlantic steamship companies that the channel be buoyed was not acceded to.

UNITED STATES STEEL CORPORATION.

Earnings.

April, 1907		$14,600,838
May, 1907		16,056,832
June, 1907		14,846,035
Total Earnings afer deducting all expenses incident to operations, including those for ordinary repairs and maintenance of plants, empolyes' bonus funds, and interest on bonds and fixed charges of the subsidiary companies		$45,503,705
Less, Charges and Appropriations for the following purposes, viz.:		
Sinking Funds on Bonds of Subsidiary Companies	$ 595,670	
Depreciation and Reserve Funds (Regular provisions)	6,127,560	
Special Improvement and Replacement Funds	1,000,000	
		7,723,230
Net Earnings		$37,780,475
Deduct:		
Interest for the quarter on U. S. Steel Corporation Bonds outstanding	$ 5,662,385	
Sinking Funds for the quarter on U. S. Steel Corporation Bonds, viz.:		
Installments	$1,012,500	
Interest on Bonds in Sinking Funds	262,078	
	1,274,578	
		6,936,963
Balance		$30,843,512
Dividends for the quarter on stocks of the United States Steel Corporation, viz.:		
Preferred, 1¼ per cent	$ 6,304,919	
Common, ½ per cent	2,541,513	
		8,846,432
Surplus for the quarter		$21,997,080
Less, appropriated from Surplus for the following purposes, viz.:		
On account of expenditures made and to be made on authorized appropriations for additional property, new plants, construction and discharge of capital obligations		18,500,000
Balance of Surplus for the quarter		$ 3,497,080

W. J. FILBERT, *Comptroller.*

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ACCIDENTS TO LAKE VESSELS

The accidents to lake vessel tonnage for the month just passed are of approximately the same number as for the month previous, and are apparently from much the same causes, although in most cases the damages sustained have been rather lighter in comparison. The notable exceptions are the steamers Maryland and Tuscarora, which were participants in a collision in the St. Clair river. Both of these vessels suffered serious injuries and are at present undergoing repairs at Ecorse. The steamers Joseph Sellwood and Sinaloa, which were in collision in the Detroit river also suffered considerable damage, the Sellwood having her plating and several frames cracked. The schooner Emma L. Coyne, which was sunk in collision with the steamer Wallula, was raised and although found to be badly damaged was repaired at Cleveland.

The passenger steamer Flora's accident in which she collided with the sand sucker John M. McKerchey in the Detroit river also provided work for the repair yard in the sum of $2,500. This was the Flora's first trip in these waters since she was rebuilt for the Toledo-Sandusky run.

A number of serious strandings will be noted. Some have been attributed to the stress of weather, others to disabled machinery and still others to the perennial source of trouble, broken steering gear.

DATE.	NAME OF VESSEL.	NATURE OF ACCIDENT.	PLACE.
July 7	Str. Henry Phipps	Struck bottom during heavy fog; uninjured	Pyramid Point.
July 10	Tug Monarch	Lost her rudder	Conneaut.
July 11	Str. Tuscarora	In collision with Str. Maryland; bow stove in; sunk; raised and repaired at Ecorse	St. Clair river.
July 11	Str. Maryland	In collision with Str. Tuscarora; bow badly damaged; repaired at Ecorse	St. Clair river.
July 11	Str. New York	Struck by Str. Tuscarora as she drifted down stream before sinking; bow damaged	St. Clair river.
July 11	Str. Bermuda	Broke wheel chains	Detroit river.
July 12	Str. City of Bangor	Collided with Str. Saxona in fog; grounded, but was slightly injured	Off Whitefish Point.
July 12	Str. Saxona	Collided with Str. City of Bangor; slightly damaged	Off Whitefish Point.
July 13	Str. D. R. Hanna	Grounded and blocked channel; released uninjured	Limekilns, Detroit river.
July 13	Str. Joseph Sellwood	Collided with Str. Sinaloa in fog; several beams and plates cracked	Detroit river.
July 13	Str. Sinaloa	Collided with Str. Joseph Sellwood; bow damaged	Detroit river.
July 13	Sch. Emma L. Coyne	Collided wtih Str. Wallula; sunk; raised and repaired	Detroit river.
July 13	Str. Wallula	Collided with Sch. Emma L. Coyne	Detroit river.
July 13	Str. Miami	Struck dock	Port Huron, Mich.
July 14	Str. Raleigh	Disabled; went aground; released	Stag Island.
July 14	Str. James P. Walsh	Struck Str. Starrucca	Buffalo harbor.
July 14	Str. Starrucca	Struck by Str. J. P. Walsh; number of plates bent and otherwise damaged	Buffalo harbor.
July 15	Str. Matoa	Bent shaft	
July 15	Str. Corunna	Machinery disabled	Port Colborne, Ont.
July —	Str. Adelia Shores	Lost foremast in storm	Lake Superior.
July 16	Str. Wisconsin	Went ashore in fog; released	Lake Superior.
July 16	Str. J. N. Foster	Broke shaft	Sturgeon Bay Canal.
July —	Str. City of New York	Aground; released; slightly damaged	Near Ogdensburg, N. Y.
July 16	Str. William S. Mack	Stranded in fog; released herself	Near Detour, Mich.
July 17	Str. John D. Dewar	Boiler plate broke	Lake Michigan.
July 17	Str. Yuma	Rammed drill boat; not damaged	Buffalo.
July 18	Str. Carolina	Ran into bridge, causing blockade; steamer uninjured	Menominee, Mich.
July 20	Str. James E. Davidson	Broke steering gear; crashed into dock; slightly damaged	Fort Gratiot.
July 20	Str. P. P. Miller	Aground; released uninjured	Mud Lake.
July 20	Str. Flora	Collided with Str. John M. McKerchey; badly damaged; loss $2,500; repaired at Bay City	Detroit river.
July 20	Str. John M. McKerchey	Collided with Str. Flora; badly damaged	Detroit river.
July 21	Str. Homer Warren	Went ashore with three consorts in heavy weather	Whitefish Point.
July 21	Bge. Friant	Ashore in tow of Str. Warren	Whitefish Point.
July 21	Bge. Thos. H. Cahoon	Ashore in tow of Str. Warren	Whitefish Point.
July 21	Bge. B. B. Buchhout	Ashore in tow of Str. Warren	Whitefish Point.
July —	Str. Premier	Struck rock; damaged wheel and rudder	Lake Erie.
July —	Str. Onoko	Aground; slightly damaged	Detour, Mich.
July 25	Str. D. R. Hanna	Broke steering gear; struck Str. Eastern States; not damaged	Buffalo.
July 25	Str. Frontenac	Struck bridge; bow badly damaged; repaired at Cleveland	Saginaw.
July 25	Str. Nevada	Aground; badly damaged	St. Lawrence river.
July 25	Str. Georgetown	Struck rock; bottom badly damaged	St. Lawrence river.
July 26	Str. Troy	Struck log; broke buckets off wheel	Portage river.
July 28	Str. John Crerar	Stranded in fog	Off Whitefish Point.
July 31	Str. Douglass	Ran aground	Walpole Island.
Aug. 1	Tug Chicago	Tripped on a tow line; sunk	Chicago.
Aug. 1	Sand Sucker Junior	Lost wheel; towed to port	Lake Michigan.
Aug. 2	Str. Eastland	Went aground; not injured	Sandusky Bay.
Aug. 5	Str. City of Chicago	Machinery disabled; towed to port	Lake Michigan.
Aug. 5	Str. City of Ottawa	Collided with bridge; not damaged	Cleveland.
Aug. 6	Str. Pascal P. Pratt	Went aground	Bar Point.

REPAIRS TO MANCHURIA.

The Union Iron Works have completed repairs to the Pacific mail liner Manchuria, probably the most extensive repairs that have been made in an American shipyard. The Manchuria ran ashore on the island of Oahu in the Hawaiian group on Aug. 20, last. After her release she made her way slowly to San Francisco. The Union Iron Works secured the contract to repair her. During her stay in dry dock 257 shell plates, 22 keel plates, 355 frame angle bars, 266 floor plates and 609 intercostal plates had to be removed and renewed. The Manchuria was placed in the dry dock at Hunters' Point. The repair bill will approximate $750,000.

BREAK IN ERIE CANAL.

The stone arches supporting the bed of the Erie canal at the point where it passes over Onondaga Creek, Syracuse, N. Y., gave way recently. Five canal boats were drawn into the vortex. The supporting walls of various industries along the canal bank were undermined. It will probably take a month to repair the break, during which time navigation on the Erie canal will be suspended. Repairs will be under the direction of Joseph Ripley, engineer for the state department of public works.

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THE TOWAGE OF THE DRY DOCK DEWEY.

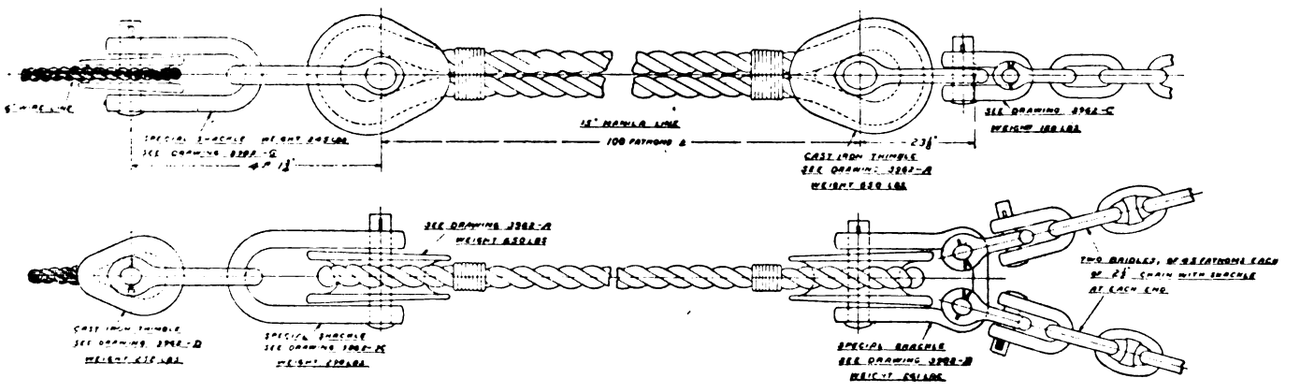
In the *Journal of the American Society of Naval Engineers*, Com'dr. F. M. Bennett, of the United States Navy, gives a very interesting account of the towage of the dry dock Dewey from Baltimore to the Philippine Islands. The author notes at an early stage of his paper that the shape of the deck was very unfavorable for towing, the submerged section being rectangular and presenting a square, wall-like surface from 7 ft. to 10 ft. in depth, and 135 ft. wide to be dragged bodily through the water. In good weather, he says, and without aid from wind or currents we found four and one-half knots to be about the maximum speed we could make with the combined power of the towing ships, which speed also was about the limit that the towing gear could stand. More powerful ships could have pulled more, of course, but any rise in speed would have been met by such increased resistance from the dock that very much stronger towing lines than any we had would have been necessary. Drawings showing several designs of floating docks were submitted in competition when proposals for building this one were invited, and at least one of these showed a dock with the ends pointed, to facilitate its being towed at sea, and it seems, in view of the long journey ahead of the Cavite dock, that some such feature should have been included in its design. The large Havana dock, it is understood, was provided with a false, pointed bow when it was towed out, and also with an enormous rudder, both of much value in keeping it manageable.

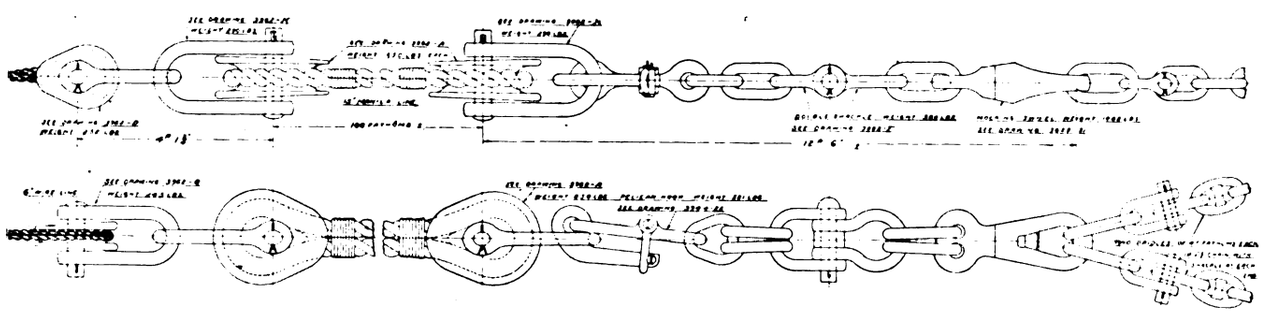
ADVISABILITY OF A SEA-GOING BOW.

The greatest troubles of the towing expedition may be directly charged against the unyielding opposition to progress of the square-fronted dock; it was a sufficiently ugly thing to tow in good weather, but in high head winds and seas, which were freely encountered, it frequently took charge beyond any power to control. On such occasions the seas and the dock gave a very good presentation of that cataclysm upon which young engineers frequently speculate, which is supposed to result from the collision of irresistible force with an immovable object, the dock playing the part of the immovable object with temporary success but with ultimate failure in all cases. Broken tow lines, the dock adrift, and a great amount of time and labor demanded to get hold of it again were the results. On some, if not all, of these occasions of disaster, hold of the dock could have been retained had it been provided with a sea-going bow, but as it was, the great seas beating upon the square front of the dock drove it backward and put a strain upon our towing gear that could not be withstood. A pointed bow, also, would have enabled us to make the voyage to the Philippines at considerably greater speed, with corresponding reductions in time, and in cost of coal and towing gear consumed.

THE VESSELS EMPLOYED FOR THE EXPEDITION.

The vessels selected for the expedition were the supply ship Glacier, the naval colliers Brutus and Cæsar and the tug Potomac. The Glacier and Potomac were manned by naval officers and crews and the colliers by merchant officers and crews. The principal dimensions of these vessels are: Glacier, 7,000 tons displacement, 353 ft. length, 46 ft. beam, 25 ft. draught, 4,000-H. P., 12.5 knots speed; Brutus, 6,600 tons displacement, 329 ft. length, 41 ft. beam, 23 ft. draught, 1,200-H. P., 10 knots speed; Caesar, 5,000 tons displacement, 322 ft. long, 44 ft. beam, 21 ft. draught, 1,500-H. P., 10 knots speed; Potomac, 785 tons displacement, 139 ft. long, 28 ft. beam, 12 ft. draught, 2,000-H. P., 16 knots speed. In actual towing in average weather the Glacier developed (by indicator) about 1,700-H. P., the Brutus 1,100 and the Cæsar 1,200, or 4,000 in the aggregate for the three ships, the combined displacements of which were more than 18,000 tons. This seems small power to move so much weight and have anything left to apply to towing a 12,000-ton dry dock, and so it was, but all things considered, the vessels were better suited for the work than higher powered cruisers or battleships would have been. Capacity for carrying coal for long periods at sea was a con-





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sideration that led to the selection of the colliers, and the demand for provisions for the expedition for a long period selected the Glacier, which ship has cold-storage space for 1,000 tons of frozen meats. The fuel question was met in her case by filling her cargo holds and part of the cold-storage space with 2,000 tons of coal. Besides providing cargo coal to burn when the bunker supply ran low, these cargoes were necessary with all the ships to keep them deep in the water and their screws submerged for effective operation. The towing ships were all single-screw vessels, which was their weakest point, as they were clumsy and hard to manage at times when handiness would have been a great comfort.

SPECIAL TOWING MACHINES.

Except the Potomac, none of these ships had any special appliances for towing, and all had therefore to be prepared after their selection for the expedition. The chief item in this preparation was the installation of a towing machine on each vessel. The machines obtained were those made by the American Ship Windlass Company of Providence, R. I., and were the size designated as No. 5, the largest that is made except on special orders. This machine is a two-cylinder steam engine, the crank shaft of which, through a pinion and drum gear, drives a large drum upon which the wire tow line, two inches in diameter and 1,200 ft. long, is reeled. The ratio of the gearing is 5 to 1, the steam cylinders are 16 in. in diameter and 16 in. stroke of piston. Steam is always on the engine when towing, being admitted through a partly open regulating valve, and its distinctive feature is in providing this steam cushion to take up any sudden jerks on the tow line. When any increased strain comes on the line, it is drawn out against the pressure of the steam in the cylinders, an automatic attachment at the same time screwing open the regulating valve until a sufficient increased pressure is admitted to the cylinders to balance the strain on the lines. Then, when the strain becomes normal again, the machine slowly winds in the few fathoms of wire that ran out, the automatic gear closing the regulating valve at the same time until equilibrium between steam pressure and strain on the line is re-established. So well did the machine work that a mark on the line always came back to within a few inches of its original place. In rough weather, with the ships pitching and wallowing deeply and the strain on the tow line consequently very variable, the machine would be working constantly, paying out wire violently and reeling it back gently, but in fairly smooth weather it would sometimes stand for hours at a time without a movement. A by-pass valve and operating lever are provided for working the machine independently of the automatic gear.

STEEL HAWSERS.

Twelve steel hawsers, of the size denominated six-inch, but rather more than two inches in diameter, were provided for use with these machines. They were each 200 fathoms (1,200 ft.) long, weighed about 7,000 pounds each, and were fitted with a thimble and shackle in one end, the other end being pointed to pass through a two-inch hole in the flange of the towing drum, where it was secured by clamps. Four of these were given to each of the three towing ships. Big as they were, they were found insufficient for the heavy strains that mid-winter Atlantic weather put upon them, and at the first opportunity 8-inch Bullivant steel hawsers, obtained from England, were substituted for them. Four of the 6-inch wires were made by the Roebling Company in the United States; the other eight came from England.

OTHER DETAILS OF THE PLANT.

Twelve 15-in. manilla hawsers were also provided. These were 200 fathoms long, and were very big, handsome lines when new, weighing five tons each. Five of them were doubled by joining the ends and fitting thimbles in the bights thus formed, the two parts of the line being stopped together every two fathoms the whole length by stout seizings of ratline stuff. As thus made up, each of these spans, with its thimbles, shackles and seizings weighed over six tons, and was, as may be readily understood, an awkward thing to handle, particularly after it had been in use for towing and had become thoroughly waterlogged. The other seven 15-in. lines were left single, with an eye for a towing thimble in one end only. The shackles, thimbles and other fittings for all these lines were made in the equipment shops at the Boston navy yard, and were enormous for such things, as may be realized from the illustrations shown herewith. In distributing these manila towing spans for use, two of the double and one of the single ones were put on the dock, and one double and two single spans on each of the three ships. The dock was provided with four bridles, each 90 fathoms long, made of 2½-in. chain cable, the legs securely bitted at opposite corners of the dock, and a towing span shackled in the middle where the legs joined. Two bridles were kept in place at each end of the dock, and at the end not in use (the stern for the time being) a towing span was kept shackled to the bridle and ranged ready for running at any time; this to save time in taking the dock in tow after a breakdown. The dock was towed from either end indiscriminately, whichever one was the easiest to get hold of under the existing circumstances. To make this possible, a wooden trestlework-bridge and derrick for handling the heavy bridles and towing spans had been built at the stern end of the dock as an afterthought while it was being prepared for sea.

AN AWKWARD INCIDENT.

While toiling forward against head wind and seas the dock became a source of anxiety because of the people on board it, thought it threatened to fall apart. The end pontoons were secured to the overhanging side walls of the central pontoon by a system of plates, angle irons and bolts, and weakness had developed in the riveted angle irons that secured the vertical fastening plates to the deck of the end pontoons. The dock was very buoyant and always had considerable motion, both rolling and pitching, in a seaway. This brought a constantly varying series of stresses and strains upon the riveted joints spoken of, which being continued for weeks without rest as the dock pitched about in the rough sea began to show disastrous results. Many of the rivets were worked loose (6,000 out of 7,000 had to be renewed), and this loosened the angle irons so that they had considerable play as the ends of the dock rose and fell, the mischief, of course, multiplying as the amount of loose motion increased. There was yet strength enough in the joints to resist considerable bad weather, but it was not prudent to let the injuries go on increasing and the commander of the expedition decided to seek the nearest port where repairs could be made. Accordingly at Las Palmas, in the Canary Islands, the dock was strengthened so that it was more seaworthy than at the start. But for this work, Commander Bennet believes that the dock would have been lost, as soon

Passages.	Miles made good.	—Time— Days.	Hours.	Daily averages.
Patuxent River to Las Palmas	3,844	56	23	67.56
Las Palmas to Port Said	2,849	32	..	89.03
Port Said to Suez	87	1	11	58.78
Suez to Singapore	4,992	48	7	103.38
Singapore to Olongapo	1,317	11	17	112.47
Totals	13,089	150	9	87.03

Ship—	Coal Consumed, Tons.	Cost of Coal.
Glacier	5,136	$ 27,224
Brutus	3,664	12,594
Caesar	3,238	14,164
Dewey	923	4,088
Totals	12,961	$ 58,070

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afterward a gale was experienced in the Mediterranean worse than any encountered in the Atlantic.

BEST DAY'S RUN.

The best day's run of the whole voyage was 152 miles, made June 9 in the Bay of Bengal, where a current of at least forty miles per day favored it; the worst day's run was in the Atlantic, where the expedition achieved minus 24 miles one day, steaming against a head wind and sea.

The details of the various passages are given in the accompanying table:

DULUTH GRAIN SHIPMENTS.

Duluth, Aug. 5.—Following are the grain figures for the week ending Aug. 2.

	Receipts.	Shipments.
Wheat	701,926	763,579
Corn	.....	.....
Oats	64,172	143,682
Rye	8,517	2,074
Barley	63,949	63,578
Flax	216,062	296,089

AROUND THE GREAT LAKES.

The steamer Benton, which was sold last spring to Canadian parties, has been purchased by Capt. H. M. Jex, of Toledo.

The steamer P. P. Pratt, bound for Milwaukee with coal, went ashore at Bar Point this week. She was released by the lighter Newman.

The six Brown electric machines at Fairport unloaded 11,922 tons of ore from the steamer Thomas F. Cole in 7 hours and 57 minutes.

The wreck of the car ferry barge which capsized under the Chicago breakwater last fall, drowning three of her crew, is being destroyed by dynamite.

The steamer building for the Atlas Steamship Co. will be named William A. Hawgood and the steamer building for the Nepture Steamship Co. will be named Arthur H. Hawgood. Both steamers will be managed by W. A. Hawgood & Co.

The vessel building at the Bridgeburg yard of the Canadian Ship Building Co. for the St. Lawrence & Chicago Steam Navigation Co. will be named E. B. Osler and the new vessel building for R. O. & A. B. Mackay will be named the Stadacona.

Capt. Alexander Cunning of the wrecker Favorite recently fell from the top of the forecastle to the deck of the barge Wayne, breaking his collarbone. Capt. Cunning was at the time engaged in releasing the Wayne.

Admiral Rider, chairman of the lighthouse board, visited Detroit last week and was in conference with President Livingstone of the Lake Carriers' Association. The subject of aids to navigation was thoroughly discussed.

Final decision as to the control of vessels in the international waters of the lower Detroit river was reached last week at a conference between President Livingstone of the Lake Carriers' Association, Col. Charles E. L. B. Davis, government engineer, and Commander S[illegible], department of marine and fisheries of the Dominion government. The controlling of the river will be continued to be done by a vessel carrying a British flag and will hereafter be maintained by the Canadian government. The tug Home Rule, commanded by Capt. J. F. Trotter, will be used for this purpose and will be under the general direction of Col. Davis.

James L. Robertson & Sons, Inc., 48 William street, New York, have just put out two cards, one devoted to Reliance Safety Column and the other to Eureka Sheet Packing. The packing carries this guarantee: That it will withstand heat, gas and ammonia, make a perfect joint, last as long as any sheet packing, and not crack while in stock within one year.

IMPROVING HARBOR AT RACINE, WISCONSIN.

Abstract of proposals for building 196 feet of crib breakwater at Racine Harbor, Wisconsin, received in response to advertisement dated July 3, 1907, and opened August 2, 1907, by Major W. V. Judson, Corps of Engineers.

	The Edward Gillen Construction Co., Racine, Wis.	P. W. Ioway, cine, Wis.	Gal- Ra-	W. H. Gil- len, Mil- waukee, Wis.	Burk, & Nelson, Muskegon, Mich.	Smith
Framing 398,000 ft. B. M. timber and plank furnished by U. S. Per M. ft. B. M...	$15.00	$11.00		$13.50	$11.90	
For 30,000 lbs. drift bolts. Per pound.....	4¾c	4c		5c	4c	
For 3,000 lbs. screw bolts. Per pound.....	5 c	5c		5c	5c	
For 2,500 lbs. spikes. Per pound.....	5 c	5c		5c	6c	
For 10,000 tons stone, per ton of 2,000 lbs..	$ 1.60	$ 1.48		$ 1.60	$ 1.80	
Total of bid.....	$23,670.00	$20,653.00*		$23,148.00	$24,236.20	

*Lowest bid.

IMPROVING HARBOR AT KENOSHA, WISCONSIN.

Abstract of proposals for building 196 feet of crib breakwater at Kenosha Harbor, Wisconsin, received in response to advertisement dated July 3, 1907, and opened August 2, 1907, by Major W. V. Judson, Corps of Engineers.

	The Edward Gillen Construction Co., Racine, Wis.	P. W. Ioway, cine, Wis.	Gal- Ra-	W. H. Gil- len, Mil- waukee, Wis.	Burk, & Nelson, Muskegon, Mich.	Smith
Framing 425,000 ft. B. M. timber and plank furnished by U. S. Per M. ft. B. M...	$15.00	$11.50		$13.50	$11.90	
For 32,000 lbs. drift bolts. Per pound....	4¾c	4c		5c	4c	
For 3,000 lbs. screw bolts. Per pound.....	5 c	5c		5c	5c	
For 2,500 lbs. spikes. Per pound.....	5 c	5c		5c	6c	
For 12,000 tons stone, per ton of 2,000 lbs..	$ 1.60	$ 1.55		$ 1 60	$ 1.80	
Total of bid.....	$27,370.00	$25,042.50*		$26,812.50	$28,237.50	

*Lowest bid.

DREDGING IN CHESAPEAKE BAY.

Dredging in Chesapeake Bay and Patapsco River leading to the port of Baltimore. Bids opened July 1, 1907, by Col. R. L. Hoxie, Corps of Engrs.

Name and Address of Bidder.	Approximate Quantities. Section "A" 8,516,470 cu. yds. Price per cu. yd.	Total.	Section "B" 508,348 cu. yds. Price per cu. yd.	Total.	Section "C" 1,621,125 cu. yds. Price per cu. yd.	Total.	Grand Total.
*Md. Dredging & Cont'r. Co., Balto., Md.....	8½c	$723,899.95	20c	$107,669.60	23c	$372,858.75	$1,198,428.30
†American Dredging Co., Phila., Pa.	9¼c	830,355.83	23c	116,920.04	29c	470,126.25	1,417,402.12
‡Morris & Cummings Drdg. Co., New York.....	10 c	851,647.00					
§Coastwise Dredging Co., Norfolk, Va.	9 3-10c	792,031.71			25 3-10c	410,144.63	

* 30 months. † 24 months. ‡ 36 months. § 40 working months.

The work is to complete a channel 600 ft. wide and 35 ft. deep, from Baltimore to the sea.

BIDS FOR DREDGING BAY RIDGE AND RED HOOK CHANNELS.

Abstract of Proposals for dredging in Bay Ridge and Red Hook Channels, New York Harbor, opened July 24, 1907, at office of Lieut. Col. W. L. Marshall, New York, N. Y.:

No. of Bid.	Name and Address of Bidders.	Price per cu. yd. measured in vessels.	Time of beginning after notification of approval of contract.	Guaranteed minimum rate of excavation per month. cu. yds.	Remarks.
1.	Morris & Cummings Dredging Co., 17 State St., New York, N. Y....	18.4c	60 days	120,000	Lowest bid.
2.	W. H. Beard Dredging Co., 21 State St., New York, N. Y.....	24 c	10 days	120,000	
3.	International Contracting Co., 95 Broad St., New York, N. Y.....	25.8c	30 days	120,000	
4.	Midland Land & Improvement Co., 62 Cedar St., New York, N. Y....	19.92c	10 days	160,000	

Amount available for work, $430,000.

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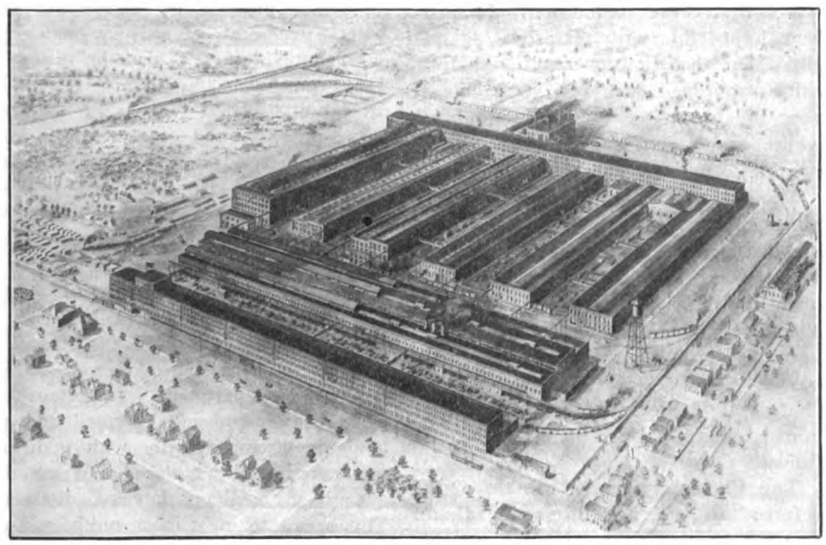
WEST ALLIS, MILWAUKEE, WORKS OF ALLIS-CHALMERS CO.

Although the manufacturing facilities of Allis-Chalmers Co. are distributed among seven large plants, located in the principal industrial sections of the country, each of which is an efficiently organized unit, to one who has made a tour of inspection of the mammoth works at West Allis it would appear that with such shops and equipment the output from these works alone would be sufficient to supply the demand for all the machinery that could be marketed by a single company in the face of modern competition.



WEST ALLIS WORKS OF ALLIS-CHALMERS CO., MILWAUKEE.

And such might be the case if Allis-Chalmers Co.'s activities were restricted to the building of power machinery alone, including prime movers of every description, electric generators and auxiliary apparatus of all kinds; but when it is recalled that this company not only stands first in this field—enormous as it is—but also leads the world in the manufacture of other machinery for industrial purposes, it will be seen what giant powers must be under control and what extensive shop facilities must be always available and in operation to provide for filling the stream of orders that daily, monthly, yearly, pours in from every quarter of the globe.

As a result of the compact arrangement of the West Allis works, it is only after having inspected them, unit by unit, that the visitor begins to comprehend their great extent. Some idea of the size of the plant may, however, be gathered from the fact that the area of the ground upon which the works are located covers 110 acres. The yards about the works are covered with a net work of railroad trackage, supplemented by an extensive system of cranes and tolophers, giving unexcelled facilities for handling heavy work of all kinds. This trackage aggregates over 12 miles in length. The extended works have been provided with a new power house with a capacity of 10,000 H. P. in turbines, gas engines and reciprocating engine units. Cooling and condensing water is provided in an open reservoir of 5,000,000 gal. capacity which is 260 ft. long, 200 ft. wide, 15 ft. deep and supplied from artesian wells.

The largest building of the group, the erecting shop, is 1,160 ft. long, while the foundry and pattern shop are each 960 ft. in length. The six machine shop units are each 580 ft. long. In the construction of this great group of buildings immense quantities of building material were used. In the addition alone the following is a partial list: 19,000 bbl. Portland Cement; 785,000 ft. of Roof Sheathing; 850,000 ft. of Yellow Pine and White Oak; 150,000 sq. ft. of wire glass, or a total of 17,145 pieces.

There are 102 traveling cranes installed in the various buildings and storage yards of the works, whose total lifting capacity is 4,030,000 lbs. or 2,015 tons.

No other industrial plant in the country has devoted such an extent of space to a single department of the foundry. The scale of the operations carried on here daily is shown in the fact that single castings weighing over a hundred tons are made for slides and bed plates of Allis-Chalmers engines without causing the slightest disarrangement of other work. The pouring of four hundred tons of metal in a single day into gas engines, steam turbines, steam engine or large electric generators and motor castings is no unusual occurrence. The melting capacity of the foundry is approximately 520 tons daily.

The area covered by the West Allis Works is divided between storage yards, trackage, runways, and actual enclosed floor space of 1,438,786 sq. ft. every portion of which is actively and continuously utilized in the construction of machinery.

Allis-Chalmers employees number in all approximately 14,200, of which over 300 are employed as engineering experts in the various departments of its organization.

ENGINE OF OLD LAKE STEAMER.

The Nautical Gazette, in a recent issue said: "Having outlived her usefulness as a freight and passenger carrier, the Long Island Sound sidewheeler C. H. Northam has been taken to Boston to be broken up for old iron."

This marks the passing of a boat that has some interest to sailors on the great lakes, as she had the splendid beam engine that was used in the Lake Erie steamer Crescent City, one of those magnificent passenger boats that were used in the express service on lakes Erie and Ontario between 1853 and 1858, the Crescent City being on the route between Buffalo, Cleveland and Sandusky. The engine was built originally by the Morgan Iron Works in New York. All of the engines that were in the fleet of eight passenger boats were taken to New York when the boats were dismantled, and all have passed out of existence, with the exception of the one in the Northam and that of the old City of Buffalo, which is now in the New York excursion steamer Grand Republic.

Capt. George A. Simpson, one of the oldest and best known captains on the lakes, died at Sault Ste. Marie last week. Capt. Simpson was a salt water sailor but came to the great lakes many years ago. He had invented a number of marine appliances and for several years had acted as compass adjuster. His death was due to asthma.

Capt. Thomas Isbell will endeavor to raise the steamer C. B. Packard, sunk in Pigeon Bay, having equipped the tug J. W. Bennett with a wrecking outfit for this purpose.

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TOLEDO WHITE LEAD CO.

Mr. George E. Hardy recently acquired nearly all of the capital stock of the Toledo White Lead Co. and is now its secretary and treasurer. He had been president of the company for the past three pears but was not actively engaged in the management of the business. Hereafter he will be in charge of it. Several improvements have been made in the plant and the business is increasing satisfactorily. This company makes a specialty of high grade marine paints. "Zenith Anti-Rust" is a life preserver for steel boats and meets with the approval of the insurance companies.

Mr. Hardy has been engaged in marine business all his life and has wide acquaintanceship along the chain of lakes. He received his first experience in the office of his father and uncle who were engaged in the towing business in Toledo in the 80's, owning the tugs Spinney, Crawford, Pathfinder and Doan. He was born on March 2, 1870. In May, 1889, he entered the employ of the H. B. Tobey Oil & Supply Co. as a solicitor of marine business and was captain of the supply tug H. B. Tobey for six years, remaining with the Tobey company altogether for nine years. On June 1, 1898, he started in business for himself and in February of the following year formed a partnership under the firm name of Hardy & Dischinger which was later incorporated under its present name of the Hardy & Dischinger Co., Mr. Hardy being secretary and treasurer. This firm began business in a very small way with a capital of only a few hundred dollars, but its annual turnover is now nearly $100,000. Mr. Hardy still retains his interest with the Hardy & Dischinger store, but devotes his time to paint manufacturing. The name of the company will probably be changed on Nov. 1 to the Hardy Paint & Varnish Co. Its trade mark will be an oak tree, "Hardy as the oak". The company has several dealers along the south shore of Lake Erie and on the Detroit and St. Clair rivers selling its goods. It is making arrangements now with others.

Associated with Mr. Hardy in the Toledo White Lead Co. is D. W. Anderson, formerly with the Detroit White Lead Works, Detroit, Mich., and the Memphis White Lead Works, Memphis, Tenn. He had been general superintendent of the company for three years, but was recently made its president.

CUNARD TURBINE STEAMER WILL LOWER TRANS-ATLANTIC SPEED RECORDS.

BY J. GOLDER.

The adoption of Parsons steam turbines for the Cunard liners Mauretania and Lusitania, after six years research represents as much progress in the building and equipment of ocean "greyhounds" as that accomplished in the first fifty years of the company's existence; and it is entirely within reason to say that, without turbines, the present high stage of efficiency would never have been reached.

Not that these steamers would have been impossible with reciprocating engines, but that the constructional difficulties involved would have been so very much greater that it is doubtful whether any engineer could be found capable of undertaking them.

The limits of the reciprocating engines appear to have been reached in the Kaiser Wilhelm II, which holds the record for trans-Atlantic speed, having made the passage between Queenstown and Sandy Hook in just five days, the best day's run being 583 knots. This vessel has 16 cylinders, 12 crank shafts, 19 boilers, 124 furnaces and consumes 660 tons of coal per 24 hours.

The Cunard turbine steamers above referred to will have four ahead and two astern cylinders, 24 boilers, 190 furnaces and will burn nearly 1,000 tons of coal per 24 hours; but they will reduce the passage to Sandy Hook from Queenstown to about 4 days, 12 hours.

It will be noted that 50 per cent more coal per day will be required for only half a day's reduction in passage. The explanation is that the type of propelling machine has very little to do with the power necessary to drive a given vessel at a given speed. The resistance offered by the water to the progress of the vessel increases in the ratio of the speed cubed and is also greatly affected by the vessel's length; hence, although these big new vessels will show from 6 to 7 per cent increase in speed over the best reciprocating engines nature demands an expenditure of some 60 to 70 per cent more energy for the privilege.

The heavy increase of power for a small increase of speed has restricted the design of trans-Atlantic fliers beyond a certain point of speed and power, and it was the advent of the turbine alone which gave the engineer a new opportunity for obtaining even a small increase of speed, because he found it possible to crowd the necessary power into the hull of his ship more easily with turbines than with reciprocating engines.

These turbines, which are the largest ever constructed, have identically the same type of blading as that used in the Parsons land turbines built by Allis-Chalmers of Milwaukee. Models of this turbine blading are being exhibited in Allis-Chalmers Co.'s space at the Jamestown Exposition.

VREDENBURG CO.

The Vredenburg Co., recently established, with an office at 1332 Monadnock block, Chicago, long distance telephone central 6795, is devoted to a consulting practice in engineering and general technical advertising, being the only concern of the kind in the west. This company is prepared to render careful and expert service to engineering, contracting and manufacturing companies, desiring intensification of their advertising, the changing of copy weekly, bi-weekly and monthly, and the preparation of dignified, attractive advertisements. The company acts as a detached advertising department, and, by reason of organization, is able to render service at a rate far less than the cost of maintenance of even a small advertising department. Important accounts are now being executed and administrated satisfactorily with good result. Accounts are placed and selection of proper mediums advised discreetly. This seems to meet most surely and accurately the desires of both publisher and advertiser, and to stimulate the reaching of that higher plane to which class advertising is destined. The manager, Clarence Vredenburg, was editor and manager of *Engineering World* from its inception until its recent sale, and has many friends in the technical field.

CRESCENT MACHINE CO.

The Crescent Machine Co., Leetonia, O., has greatly increased its capacity since locating in its new plant. The company is now working on drawings and patents for additional lines in machines which it will bring out in the near future. Announcement of them will be made in due course. The 1907 edition of the company's catalog of wood-working machinery is just from the press. Three new machines have been added since the last catalog was published, the Crescent disk grinder, the Crescent single spindle shaper and the Crescent single cut-off saw. These machines are thoroughly described in the catalog, as well as the company's regular line of band saw machines, band saw blades, saw tables and jointers.

The steamer Wisconsin was released from Parisian Island after lightering about 600 tons of her ore cargo.

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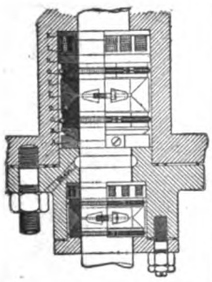

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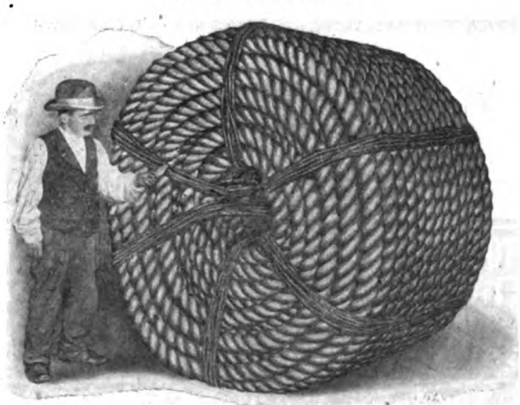

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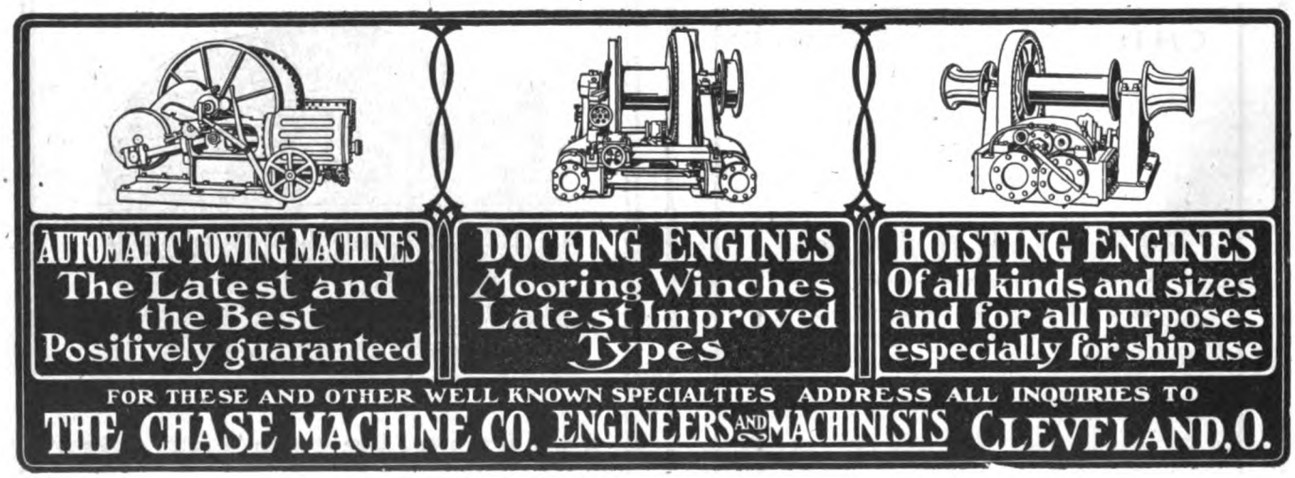
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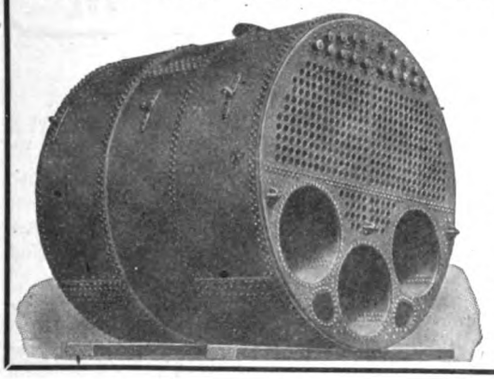

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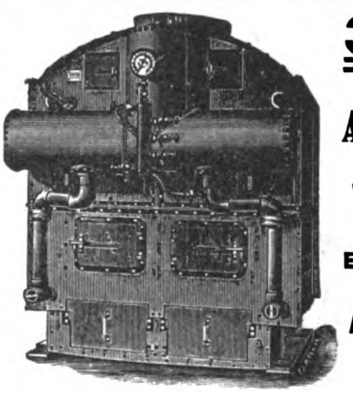

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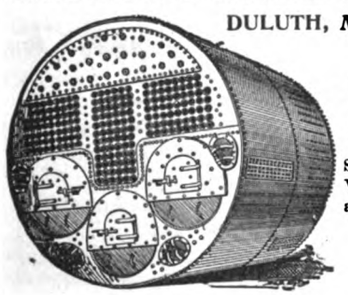

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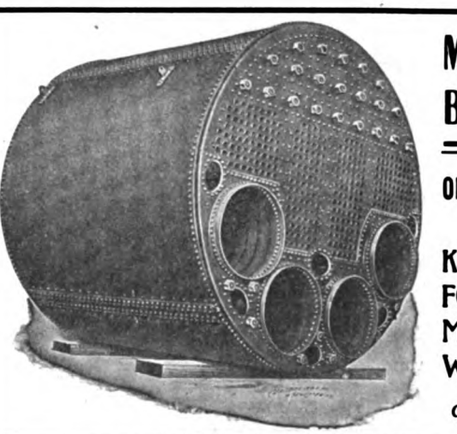

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